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TM 11-5895-558-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

RADIO SET AN/TRC-146

CU 1669
618T

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1968

WARNING

Be careful when working on the 115-volt ac line connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES EXIST IN THE FOLLOWING COMPONENTS OF RADIO SET AN/TRC–146:

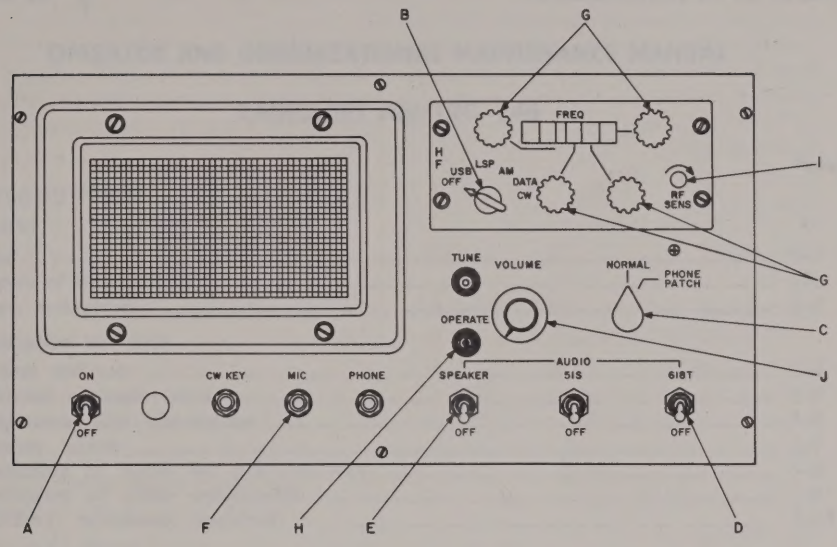
Coupler, Antenna CU–1669/GRC	12,000 volts
Whip antenna	12,000 volts
Receiver-Transmitter, Radio RT–698/ARC–102	12,000 volts

DANGEROUS VOLTAGES EXIST AT THE FOLLOWING AREAS:

Power supply	115 volts or 230 volts

Be careful when working around the antenna terminals. Radiofrequency high voltages exist at these points. Dangerous voltages may exist even after the equipment is turned off. All requirements of TB SIG 281 *must* be observed at all times.

CONDENSED OPERATING INSTRUCTIONS FOR RADIO SET AN/TRC-146



1. SET (ON/OFF SWITCH) A TO ON.
2. SET (FUNCTION SWITCH) B TO DESIRED MODE OF OPERATION.
3. SET (NORMAL/PHONE PATCH SWITCH) C TO NORMAL.
4. SET (618T/OFF SWITCH) D TO 618T.
5. SET (SPEAKER/OFF SWITCH) E TO SPEAKER.
6. CONNECT MICROPHONE TO (MIC JACK) F.
7. SET (FREQUENCY CONTROL KNOBS) G TO DESIRED FREQUENCY.
8. MOMENTARILY KEY MICROPHONE.
9. WHEN (OPERATE LIGHT) H LIGHTS, ESTABLISH COMMUNICATION WITH A DESIRED CONTACT.
10. ADJUST (RF SENS) I AND (VOLUME CONTROL) J FOR DESIRED LEVEL OF AUDIO.

TM5895-558-12-11

TECHNICAL MANUAL
No. 11-5895-558-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *14 March 1968*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

RADIO SET AN/TRC-146

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*This manual supersedes so much of TM 11-5895-558-15, 23 August 1967, as pertains to installation, operation, and operator and organizational maintenance.

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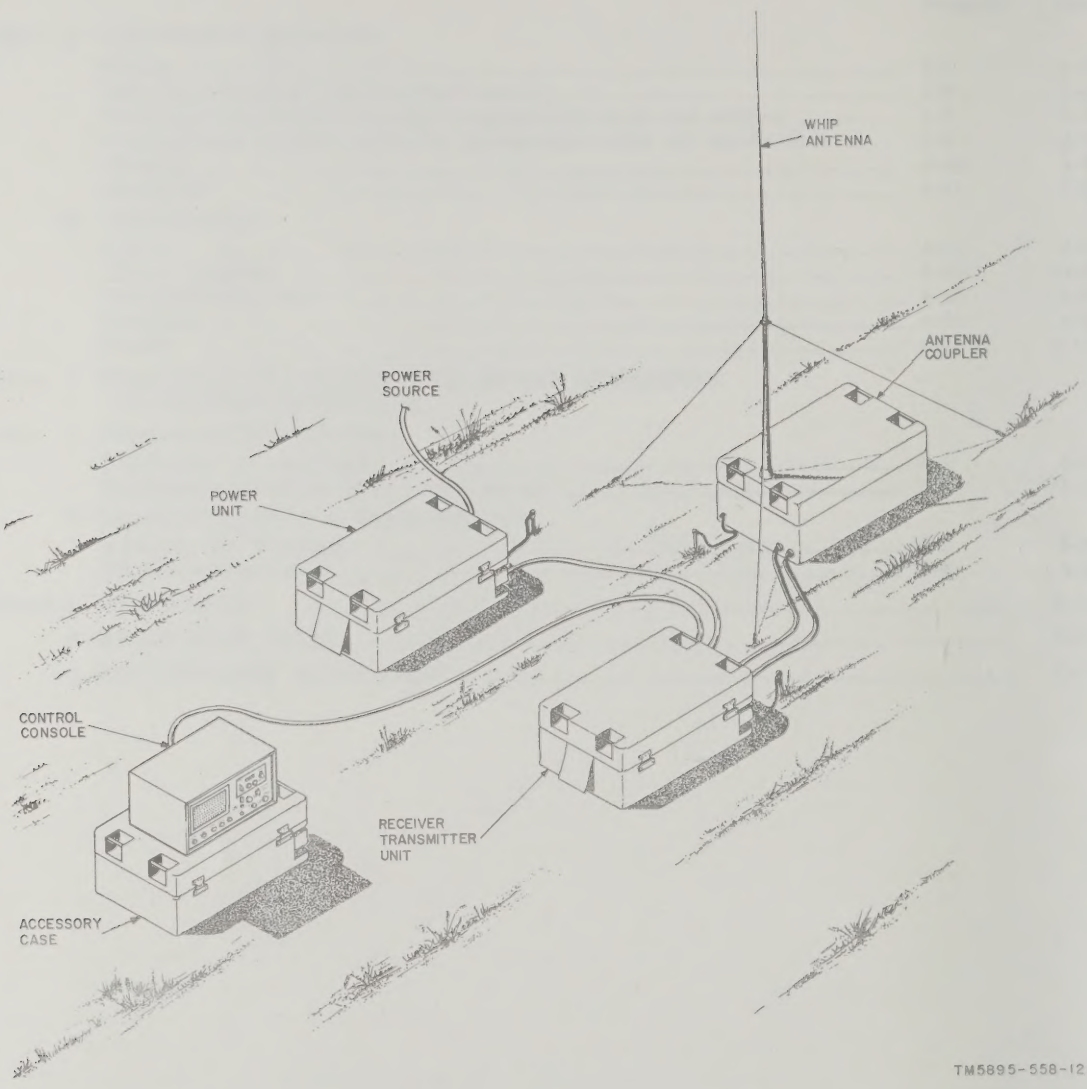

Figure 1-1. Radio Set AN/TRC-146.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Radio Set AN/TRC-146 (radio set) (fig. 1-1) and provides operating procedures and instructions for organizational maintenance. Also included are cleaning instructions, installation, and siting.

b. The operating instructions for Radio Set AN/TRC-146 include procedures for testing the various operating circuits on a system level. These instructions will aid the technician in determining the serviceability of Radio Set AN/TRC-146 and will aid in locating the faulty component.

c. Basic issue items list (BIIL) is included in appendix B. Maintenance allocation chart (MAC) is in appendix C.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army), NAVSUP Publications 378 (Navy), AFR 71-4 (Air Force), and MCO P4610-5 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF361) as prescribed in AR 55-38 (Army), NAVSUP Pub 459 (Navy), AFM 75-34 (Air Force), and MCO P4610.19 (Marine Corps).

d. Report of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-ME-NMP-CR, Fort Monmouth, N. J. 07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Radio Set AN/TRC-146 (fig. 1-1) is a transportable, high-frequency (hf) radio communications set with provisions for continuous-wave (cw), voice, and frequency-shift keying (fsk) teletypewriter transmission and reception. The frequency range is from 2.000 to 29.999 megahertz (MHz) on any one of 28,000 channels spaced 1 kilohertz (kHz)

apart. Voice operation of the AN/TRC–146 can be upper or lower single sideband (usb or lsb) or amplitude modulation (am.). Upper sideband transmission and reception is always used for the cw and fsk modes.

b. Phone patch connections are available on the control console. A voice-operated transmit (vox) module permits phone patch operation without the necessity of press-to-talk control of the transmitter.

c. The AN/TRC–146 is a ground-transportable or air-transportable radio set to permit ground or air communication. For communication with aircraft, the AN/TRC–146 is compatible with Radio Set AN/ARC–102. For ground communication, the AN/TRC–146 is compatible with Radio Sets AN/MRC–95, AN/GRC–158, and AN/MRC–117; Communications Facility, Mobilized AN/MRC–119; and Communications Facility, Jeep Mounted AN/MRC–120. The operating range of the AN/TRC–146 will vary according to terrain, atmospheric conditions, time of day or night, type of antenna used, the height of the antenna above the earth, and frequency.

d. The AN/TRC–146 is designed for rapid installation and teardown. Each of the four major components may be easily carried by two men and placed on a vehicle or in an aircraft. The 100-foot cables furnished with the equipment permit the radio equipment to be located in an area suitable for best transmission or reception, while the radio operator may operate the equipment from a foxhole, bunker, or other fortified area up to 100 feet from the equipment. For additional information on equipment siting and installation, refer to paragraphs 2–3 and 2–4.

Note. The National Bureau of Standards has officially adopted the term HERTZ for cycles per second (abbreviated Hz). The chart below provides the common equivalents.

Unit/quantity	Old term	Old abbrev	New term	New abbrev
Frequency	Cycles per second	cps	Hertz	Hz
10^3 cycles per second	Kilocycles per second	kc	kilohertz	kHz
10^6 cycles per second	Megacycles per second	mc	megahertz	MHz

1–5. Technical Characteristics

Radio Set AN/TRC–146:
- Frequency range——2.0 to 29.999 MHz.
- Type of modulation——Amplitude
- Types of transmission——Am., usb, lsb, cw, or fsk.
- Output power——100 watts pep in usb or lsb mode.
- Antenna——32-ft whip.

Power unit:
- Power supply:
  - Input voltage——115/230 volts ac ±10%, 57 to 63 Hz, single phase; or 115/230 volts ac ±10% 380 to 420 Hz, single phase; or 28 volts dc, 50 amperes.
  - Output——28 volts dc at 50 amperes.
  - Regulation——±5%.
  - Ripple——2 volts peak to peak.
- Inverter:
  - Input voltage——28 volts dc nominal.
  - Output——115 volts ac, 400 Hz
  - Power——250 va.
  - Regulation——±2%.

1–6. Components and Dimensions

a. Components. The components of Radio Set AN/TRC–146 (fig. 1–1 and 1–2) are listed in the basic issue items lists (app. B).

b. Dimensions.

Quantity	Item	Dimensions (in.) Height	Depth	Width	Unit weight (lb)
1	Receiver transmitter unit including:	12–1/2	29	22–1/2	87
1	Receiver-transmitter case				
1	Receiver-transmitter, Radio RT–698/ARC–102	7–55/64	22–1/2	10–17/64	50
1	Antenna coupler including:	12–1/2	29	22–1/2	85
	Antenna coupler case				

Quantity	Item	Dimensions (in.) Height	Depth	Width	Unit weight (lb)
1	Coupler, Antenna CU–1669/GRC	7–5/8	12–5/8	10–1/8	19.7
1	Rf cable assembly (100 ft)				11.0
1	Control cable assembly (100 ft)				16.0
1	Antenna base	14			2.5
1	Antenna guy fitting				0.25
3	Nylon guy ropes (30 ft)				1.0
1	Tiedown kit:				
1	Canvas bag				
3	Guy anchor, screw type	14			4
1	Power unit including:	12–1/2	29	22–1/2	136
	Power unit case				
1	Power supply	7–5/8	20	10–1/8	85
1	Inverter	4–1/8	10–1/4	6–1/2	13.5
1	Accessory case including:	12–1/2	29	22–1/2	84
1	Control console	9–1/2	11	17	21
1	Control cable assembly (100 ft)				28
1	Power cable assembly (10 ft)				3.0
1	Differential carbon microphone				0.5
1	Power cable assembly, 230 volts ac (8 ft)				1.0
1	Power cable assembly, 115 volts ac (8 ft)				1.25
3	Ground cable (6 ft)				0.75
1	Antenna case including:				
1	Whip antenna Element consisting of:		55	5	23
1	Antenna Element AT–1039/U	52			0.125
1	Antenna Element AT–1040/U	52			0.475
1	Antenna Element AT–1041/U	52			1.25
1	Antenna Element AT–1042/U	52			1.625
1	Antenna Element AT–1043/U	52			1.0
3	Ground rod	48	3/8		6.0

1–7. Common Names

A list of nomenclature assignments for the components of Radio Set AN/TRC–146 is given below. A common name is indicated after each item.

Nomenclature	Common name
Receiver transmitter case	Rt case
Receiver-Transmitter, Radio RT–698/ ARC–102.	Transceiver.
Antenna coupler case	Antenna case.
Coupler, Antenna CU–1669/GRC.	Antenna coupler.
Rf cable assembly (100 ft)	Rf cable.
Control cable assembly (100 ft).	Control cable.
Power cable assembly (10 ft).	Power cable.
Differential carbon microphone.	Microphone.
Power cable assembly, 230 volts ac (8 ft).	230–volt power cable.
Power cable assembly, 115 volts ac (8 ft).	115–volt power cable.

1–8. Description of Radio Set AN/TRC–146

a. Radio Set AN/TRC–146. This includes a receiver-transmitter (rt) unit, an antenna coupler, a power unit, a control console, an antenna, and interconnecting cables. Figures 1–1 and 1–2 show all the components of the radio set.

b. Rt Unit. The transceiver mounts in the rt case. The rt case cover may be open or

closed while operating the transceiver, depending upon the environmental conditions. However, all ventilation doors must be open to complete the interlock circuit. Refer to TM 11–5821–248–12 for further information on the transceiver.

c. Antenna Coupler. The antenna coupler mounts in the antenna case and is connected to the transceiver by an RG–8/U transmission line and power cable. The antenna coupler automatically matches the antenna to the transceiver over a 2– to 30–MHz frequency range. The tuning cycle requires a maximum of 10 seconds for any frequency. When being transported, a seal plug is screwed into the antenna receptacle to keep out dirt and moisture. For additional information on the antenna coupler, refer to TM 11–5821–271–15.

d. Power Unit. Circuit breakers are located inside the power unit case. The power supply mounts in the power unit case and is of solid state design. It delivers 27.5 volts direct current (dc) at 50 amperes. It operates from 115– or 230–volt, 47– to 63–Hz or 380– to 420–Hz power. Voltage regulation is 5 percent with a maximum ripple voltage of 2 percent peak to peak (fig. 2–5).

e. Inverter. This mounts in the power unit case with the power supply and is also solid state. Inverter input is 27.5 volts dc and output is 250 volt amperes (va) at 115 volts, 400 Hz, single phase.

f. Control Console. The console (figs. 3–1 and 5–2) is transported in the accessory case and is the operating position for the AN/TRC–146. The control console contains Control, Radio Set C–3940/ARC–94 (described in TM 11–5821–248–12), a speaker/amplifier assembly, and an amplifier/vox module assembly. Fuses at the rear of the control console protect the speaker/amplifier and amplifier/vox module circuits. The speaker/amplifier assembly may be used instead of a headset. Maximum audio output is 12 watts. The amplifier/vox module is used only in the phone patch mode. All switches, jacks, level adjusting pads, and controls required for the various operating modes are incorporated in the control console.

g. Antenna. The antenna is transported in the antenna case. The antenna consists of eight sections. Each section is 4 feet long and threaded on each end, except the top section which is threaded at the bottom only. This assembled antenna screws into the antenna base which, in turn, screws into the top of the antenna coupler case. Nylon guy ropes and associated hardware are provided to tie down the antenna. The antenna is connected to the transceiver by two 100-foot cables, a power cable, and a radiofrequency (RF) cable.

1–9. Description of Minor Components (fig. 1–2)

a. The differential carbon microphone is used for voice transmission when not using phone patch facilities at the transmitter.

b. The power cable assembly, 230 volts alternating current (ac) (8 ft), connects the power unit to a 230-volt ac power source.

c. The power cable assembly, 115 volts ac (8 ft), connects the power unit to a 115-volt ac power source.

d. The power cable assembly (10 ft) connects the power unit to the rt unit.

e. The control cable assembly (100 ft) connects the rt unit to the control console for remote operation.

f. Ground rods are driven into the ground and connect the power unit, rt unit, and antenna coupler to ground to reduce the danger of electrical shock.

g. Ground cables (6 ft) connect the power unit, rt unit, and antenna coupler to the ground rods.

h. The RF cable assembly (100 ft) connects the antenna coupler to the rt unit.

i. The control cable assembly (100 ft) connects the antenna coupler to the rt unit for remote operation.

j. The antenna base is screwed into the antenna coupler and the antenna is crewed into the antenna base.

k. The antenna guy fitting connects the guy ropes to the antenna.

l. Guy anchors, screw-type, are placed into the ground and provide tiedown points for the guy ropes.

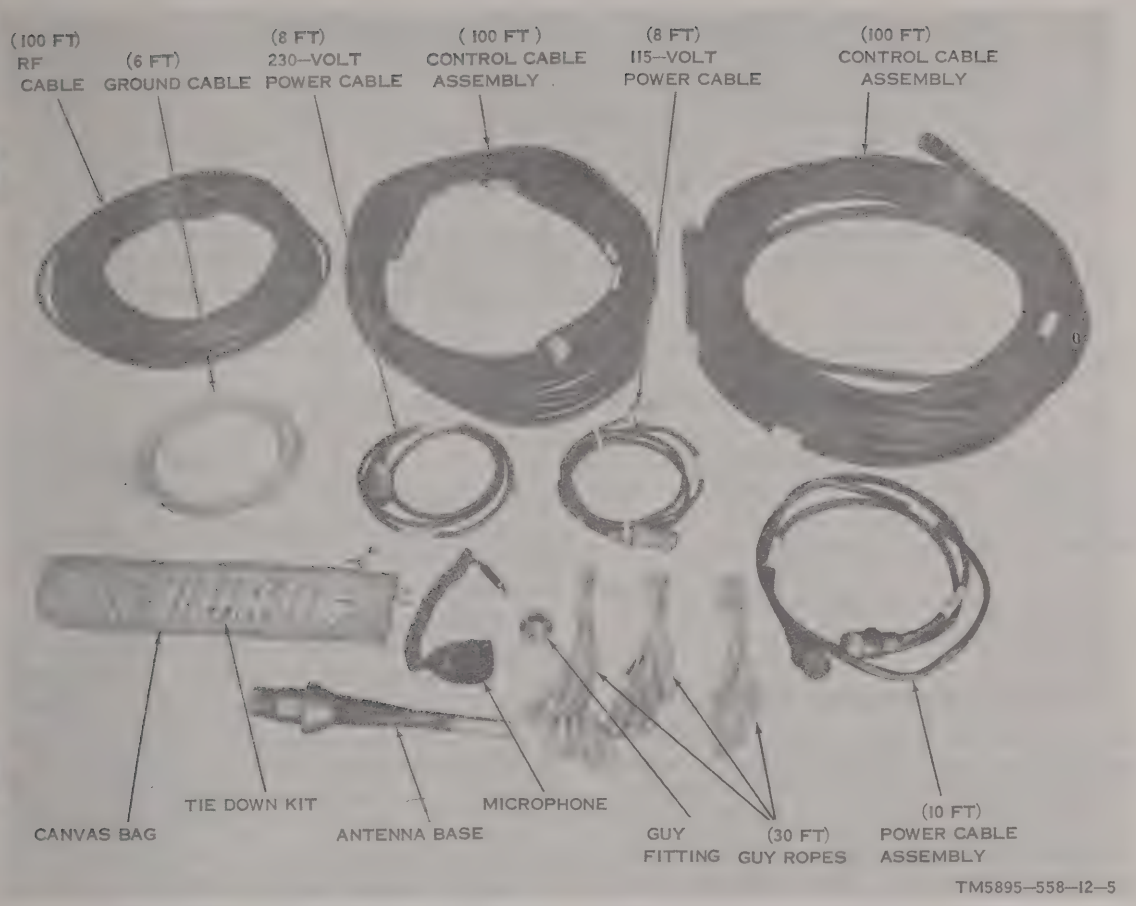

Figure 1–2. Radio Set AN/TRC–146, minor components.

m. Nylon guy ropes (30 ft) connect the guy fitting to the guy anchors to hold the antenna in a vertical position.

1–10. Additional Equipment Required

The following equipment is not supplied as a part of Radio Set AN/TRC–146:

a. Headset, High-Impedance. The headset is part of the installation kit required for field operation. It is used for monitoring the received signal when the amplifier/speaker is not used.

b. Dc Source. Twenty-eight volts dc from a 28-volt dc ground power unit may be used if primary dc power is not available. The standard cable connector for military power units may be plugged into the mating receptacle on the power supply unit. Refer to appendix A for a partial listing of these power supplies.

CHAPTER 2

INSTALLATION

***Warning*: During installation of this equipment, conform to all safety requirements set forth in TB SIG 291. Injury or DEATH could result from failure to comply with safe practices.**

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2–1. Unpacking

a. Packaging Data. When packed for shipment, the components of Radio Set AN/TRC–146 are enclosed in a wooden packing case. Exploded views of the packaging for the AN/TRC–146 are shown in figures 2–1 and 2–2. The outside dimensions of the packing cases are 64 by 29 by 37 inches. The gross weight of the packing case is 621 pounds, and the volume is 39.5 cubic feet.

b. Removing Contents (figs. 2–1 and 2–2). The unpacking procedures are given in (1) through (9) below.

(1) Cut and fold back the metal straps.

***Caution:* Do not attempt to pry off the wooden cover; equipment damage may result.**

(2) Remove the nails from the wooden cover of the packing case with a nailpuller, and lift off the wooden cover.

(3) Remove the waterproof paper wrap carton from the packing case.

(4) Using a knife or sharp instrument, cut the waterproof paper wrap, and remove same from carton.

(5) Cut open the moisture-vaporproof barrier, and remove the inner corrugated carton.

(6) Using a knife or sharp instrument, cut the tape that seals the inner corrugated carton, and open the flaps.

(7) Remove the technical manual and the top protective cushion from inside the inner corrugated carton.

(8) Remove the grade A, paper-wrapped component of the AN/TRC–146 from the protective cushion enclosure inside the inner corrugated carton.

(9) Remove the AN/TRC–146 component from the grade A paper wrap.

2–2. Checking Unpacking Equipment

Note. Components shipped in the antenna coupler case are shown in figure 5–1. Components shipped in the accessory case, to include the control console, are shown in figure 5–2.

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage in accordance with paragraph 1–3.

b. See equipment list in cover of accessory case for location of stored parts. If a packing slip is not available, check the equipment against the basic issue items list (app. B). Report all discrepancies in accordance with TM 38–750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manual.

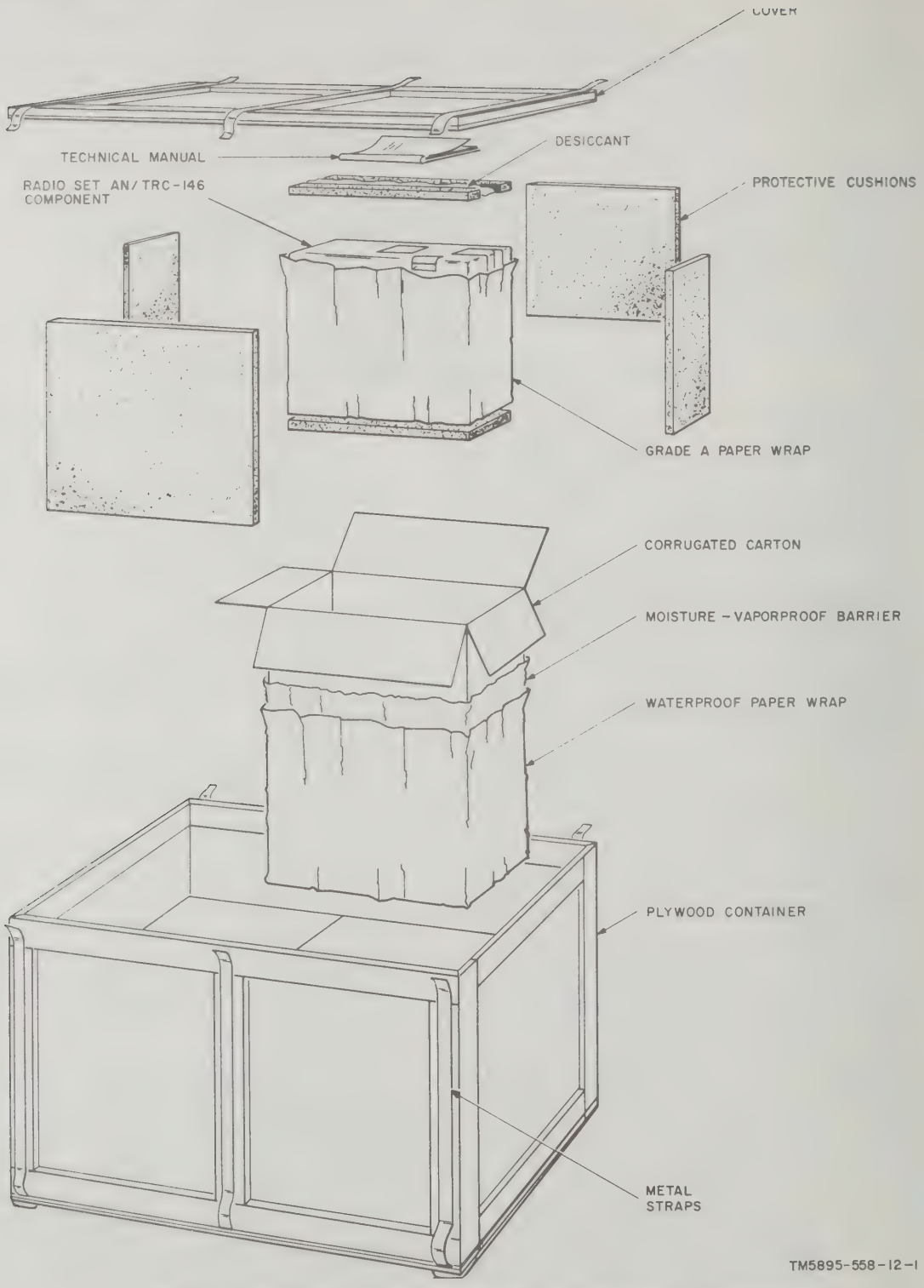

Figure 2-1. Packaging of Radio Set AN/TRC-146 components, less antenna case.

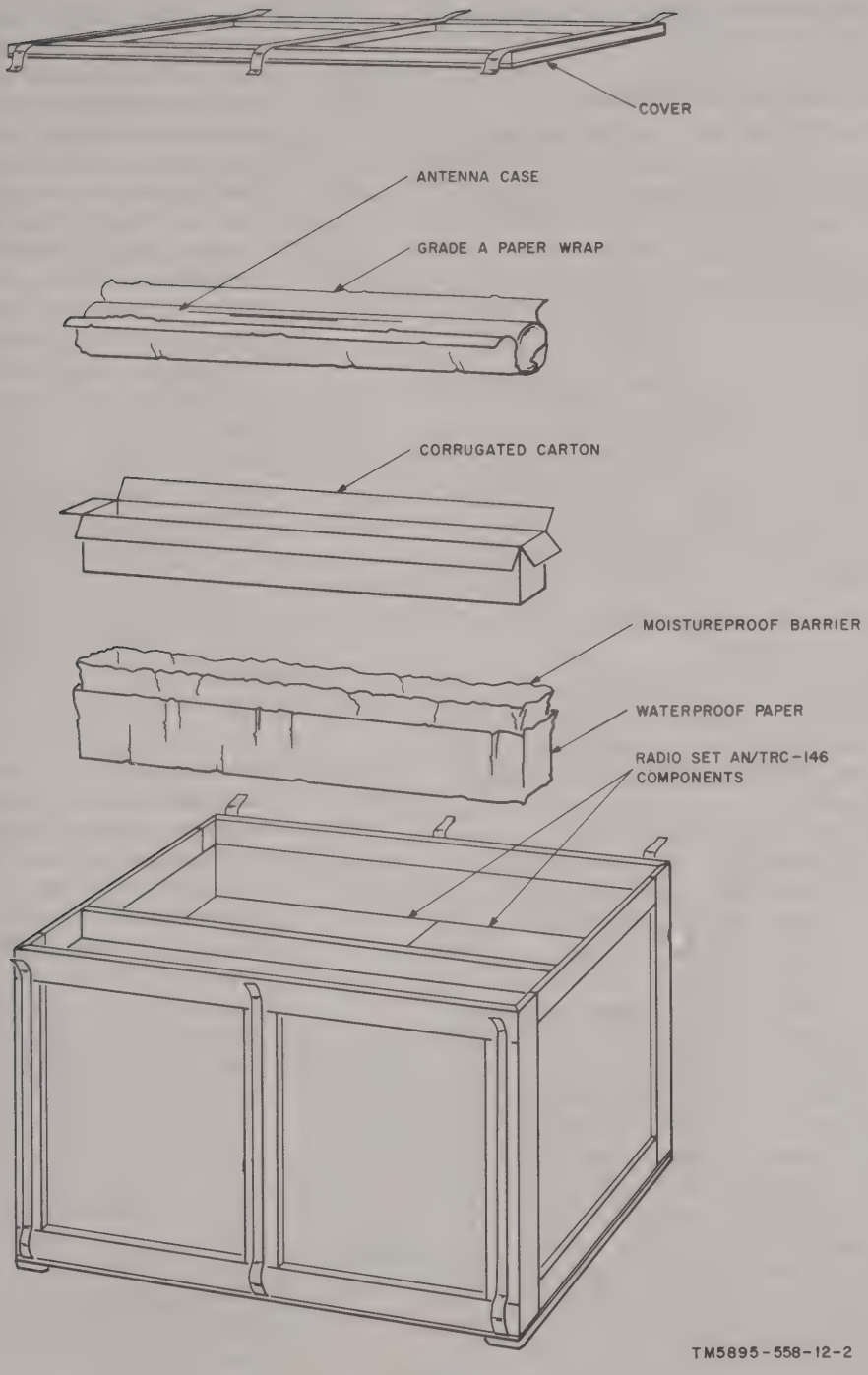

Figure 2-2. Packaging of antenna case.

Note. Current MWO's applicable to the equipment are listed in DA Pam 310–7.

2–3. Hf Band Siting Information

a. The importance of proper location of hf radio sets cannot be overemphasized. The choice of a site depends largely on the nature of the local and intervening terrain, and the tactical situation. Other factors involving hf radio systems must also be considered.

b. Radio Set AN/TRC–146 requires consideration of line-of-sight characteristics when operating near 30 MHz. Near the frequency, the distant station should be within the *radio* line of sight. (The radio line of sight is slightly longer than the actual, visual line of sight.) The line of sight increases as the altitude of either or both antennas increases. Thus, it is possible to communicate with an aircraft flying at several thousand feet, over a greater distance than is possible with both radio sets on the ground.

c. Radio Set AN/TRC–146 operates in the hf band (3–30 MHz), although the lowest frequency of the equipment, 2 MHz, has many of the characteristics of the medium-frequency band.

(1) *Groundwave transmission.*

(*a*) Transmission is usually done by groundwave; the stronger the RF output of the transmitter, the greater is the distance covered. However, the groundwave tends to *bend* in a forward direction. That is, the top of the transmitted radio wave moves slightly more rapidly than does the bottom; eventually, the signal bends to such a degree that a further increase in signal strength causes no further increase in distance by groundwave. Thus, there is a practical limit to groundwave transmission, particularly at the lower frequencies of these two radio systems.

(*b*) At the higher end of the frequency range of the system, line-of-sight characteristics become more prominent, and less bending of the signal occurs. Lesser obstructions (trees, low buildings, small hills, etc) have little effect on the groundwave propagation of hf radio signals.

(*c*) In jungle growth, however, this is not necessarily true. Frequencies between 20–30 MHz are generally useless for any significant amount of distance. Nearly ideal groundwave propagation characteristics may be achieved between 2–5 MHz; in these frequency ranges, relatively longdistance rf propagation has been found to be quite efficient in dense jungle foliage. If and when that frequency range is not ideal, skywave propagation between 15–18 MHz may be utilized ((2) below). Further information on rf transmission and reception in jungle areas is discussed in paragraph 2–4.

(2) *Skywave transmission.*

(*a*) Another consideration of these two equipments is *ionospheric propagation.* In this case, the skywave strikes the ionized layers of atmosphere above the earth and is *refracted* (bent) back toward the earth. The lower the frequency, the greater the index of refraction, and the shorter the distance covered by the skywave from the transmitter to the distant receiver.

(*b*) Near the high end of the AN/TRC–146 frequency range, the refracting of the skywave is less pronounced, and distances between the transmitter and remote receiver may increase to hundreds, or even thousands, of miles. However, the antennas of both equipments do not favor long-distance skywave transmission since they radiate rf energy in all directions, although this propagation possibility cannot be ruled out.

(*c*) At night, the ionosphere effectively rises, and signals travel

even farther than they do during the day. In addition, with a given rf power output, sideband transmission propagates with a higher signal quality for greater distances than does conventional am. These propagation factors must be considered, since hostile forces could intercept voice communications at great distances from the combat area.

2–4. Siting in Woods and Jungles

The following rules apply regardless of topography:

a. Avoid dense woods, particularly using the higher frequency channels of the AN/TRC–146. The higher the frequency, the more radio energy absorbed by the nearby trees. If it is impossible to avoid dense woods or jungles, the radio sets should be located in sizable clearings.

b. When the radio set must be operated near dense woods, try several sites a short distance apart and select the one that gives the best results.

c. In jungles, it may be necessary to assemble and erect antenna masts that will raise the antenna above the jungle growth. Clearings at least 100 yards in diameter may be used. Transmission over open paths across a river or along open river valleys is recommended, where feasible.

2–5. Siting in Flat Terrain

a. In flat country, best performance will result if these rules are followed:

(1) Place the antenna as high above the ground as possible.

(2) Avoid depressions; select any slight rise of terrain in the vicinity.

b. Any increase in the effective antenna height (that is, the height of the antenna over the average surrounding ground) will usually give an increase in signal strength, and longer distances can be covered.

2–6. Siting in Mountainous Terrain

The following rules are guides to good siting in mountainous terrain:

a. Locate the radio set on the side of a hill facing the distant station and high enough to provide a line-of-sight path, if possible.

b. If line-of-sight locations are not available, choose a site as far as possible from the base of the obstruction.

c. River valleys and gaps between mountains may provide transmission paths devoid of high intervening hills.

d. Experimentation with the exact location and orientation of the antenna may produce a better signal.

2–7. Siting Near Water

Since the AN/TRC–146 operates in the hf band, reception and transmission at a riverside location or beach will be as good as if the system were located back from the edge of the water, either on flat terrain or from hills or small rises back from the water's edge.

2–8. Antenna Orientation

The antenna provided with the AN/TRC–146 is nondirectional. A perfectly nondirectional, or omnidirectional, antenna permits the radio set to work equally well in any direction from the antenna, provided that there are no obstructions to impede the transmission of the radio waves. Several antenna and combination antenna/mast units are available for extending the range of the equipment. Refer to Appendix A for a partial listing of these tactical antenna systems.

2–9. Installation of Equipment

For best equipment performance, select a site on relatively high terrain. Select the antenna site first, and then place the other unit as follows:

a. Antenna Coupler. Set the antenna coupler on the highest terrain at the site that has been selected. Be sure that the position is clear of overhead obstructions. Remove the seal plug from the antenna receptacle and stow it in the accessory case. Ground the antenna coupler, using the cable and ground rod (*f* below).

Caution: **Use any necessary manpower to assemble the 32-foot whip antenna. Its height and flexibility make it extremely awkward to handle, particularly in brisk winds.**

b. Whip Antenna. Assemble the antenna on the ground by connecting the eight sections and antenna base together. Slide the guy fitting over the small end of the antenna and down the antenna until it stops near the center section of the antenna. Mark off a 13 1/2-foot radius around the antenna coupler and place the guy anchors 120° apart around the circumference of the circle. Screw the guy anchors into the ground, using the guy anchor handle provided. Connect the three guy ropes to the guy fitting on the antenna. Connect the free ends of two of the guy ropes to two of the guy anchors. Erect the antenna, and set the base of the antenna into the antenna receptacle on top of the antenna coupler. Allow the antenna to rest against the two guy ropes that are tied down. Steady the antenna with the third guy rope. Fasten the free end of the third guy rope to the third guy anchor. Screw the antenna base into the antenna coupler. Adjust the guy ropes for equal tension with the antenna in a vertical position.

c. Power Unit. Place the power unit within 8 feet of the primary power source. Refer to paragraphs 1–8*d* and 1–10*b* for power source requirements. Ground the power unit with the cable and ground rod (*f* below).

d. Rt Unit. Place the rt unit within 10 feet of the power unit and within 100 feet of the antenna coupler. Ground the rt unit with the cable and ground rod (*f* below).

e. Control Console. Remove the control console from the accessory case, and place the control console at any convenient operating location within 100 feet of the rt unit.

f. Grounding. Ground rods and cables are provided (para 1–6) for the power unit, rt unit, and antenna coupler. For field operations, ground these components by driving a ground rod into the earth next to the component and connecting ground cables from the ground rod to the studs provided on each case. When the AN/TRC–146 is operated inside a shelter, ground each unit to the nearest suitable electrical ground.

2–10. Connections

***Caution:* To avoid transistor damage, make sure that all power switches are at OFF before making cable connections. Observe polarity when operating from a 28-volt dc source as TRANSISTORS MAY BE PERMANENTLY DAMAGED BY IMPROPER VOLTAGE OR POLARITY.**

a. Cabling (fig. 2–3). Remove the protective caps from the electrical connectors on the equipment. Connect the cables as shown in figure 2–3.

b. Operation From 115-Volt Ac Power. Connect 115-volt power cable from J8 on the power unit to 115-volt ac power source.

c. Operation From 230-Volt Ac Power. Connect 230–volt power cable from J8 on the power unit to 230–volt power source.

d. Operation From 28-Volt Dc Source. Set the EXTERNAL-INTERNAL switch adjacent to J9 on the power unit to EXTERNAL. Connect 28-volt dc power to 28–volt dc receptacle J9.

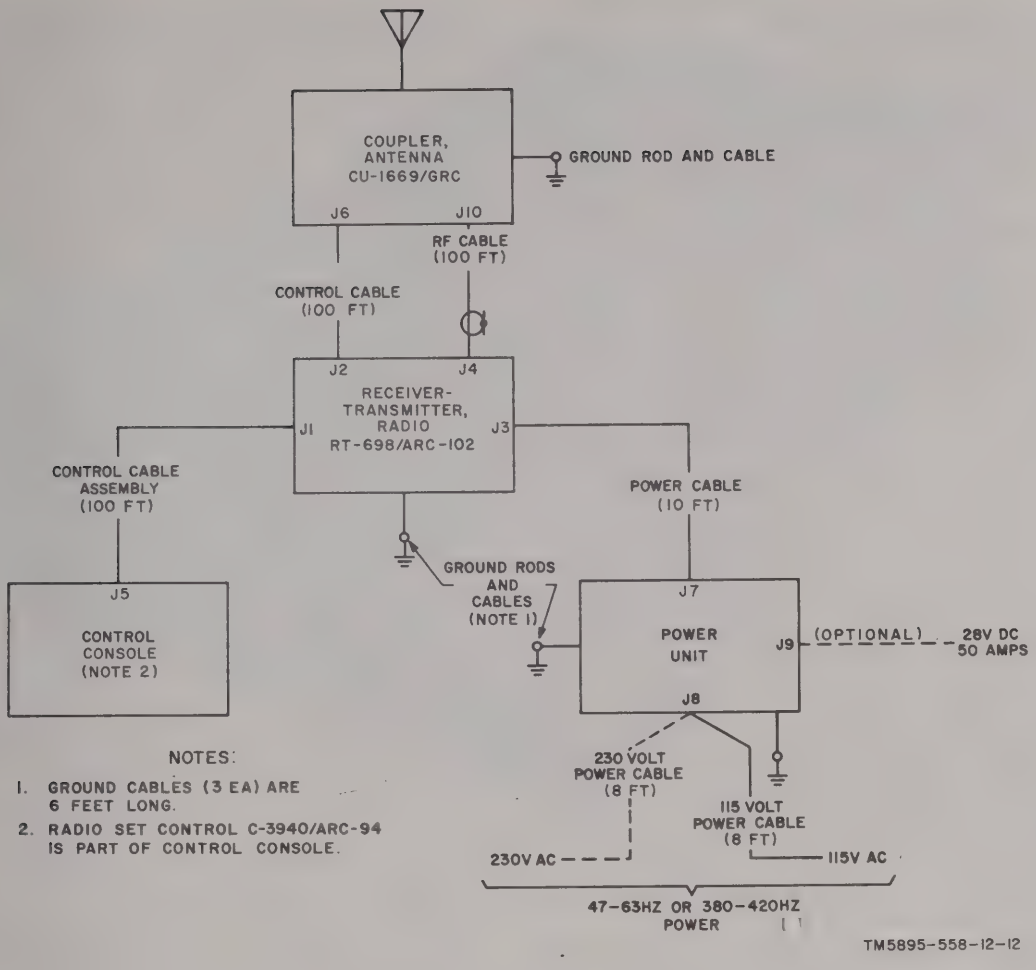

Figure 2–3. Radio Set AN/TRC–146, cabling block diagram.

Section II. INITIAL ADJUSTMENT OF EQUIPMENT

2–11. Preliminary adjustment of AN/TRC–146

With the equipment in position and the cables connected, the equipment is ready for operation. Perform the following steps to set up normal voice communications:

a. Open the ventilation doors on both ends of the rt unit and power unit (fig. 2–4).

Note. The equipment will not operate unless *all* ventilating doors are open.

b. Remove the cover on the power unit, and set circuit breakers to ON (fig. 2–5). Replace cover.

c. Set control console ON-OFF switch to ON.

d. Set function switch on the control console subpanel Radio Set Control C–3940/ARC–94 to the desired mode of operation (fig. 3–1). Allow a 2-minute warmup period before keying the transmitter.

e. Connect the headset and carbon microphone to the control console.

f. For push-to-talk or vox operation, set the NORMAL-PHONE PATCH switch to NORMAL, and then set the 618T–OFF switch to 618T.

g. If it is desired to use the speaker/amplifier on the control console, turn the SPEAKER-OFF switch to SPEAKER.

Note. Turning the SPEAKER-OFF switch to OFF does not turn off the headset *if* the headset is left plugged in.

h. Select a frequency on the control console subpanel Radio Set Control C–3940/ARC–94 by setting the frequency control knobs to the desired frequency between 2.000 to 29.999 MHz.

i. Momentarily push the microphone button. A tune tone will be heard in the headset (or speaker/amplifier, if connected) while the transceiver and antenna coupler are tuning. Maximum tune time is nominally 10 seconds and will depend upon the amount of frequency change. While tuning, the amber (TUNE) lamp should light; when the tuning cycle is completed, the green (OPERATE) lamp should light, indicating the AN/TRC–146 is ready for transmission and reception. These lamps are similar to the amber and green lamps on the antenna coupler; for additional information on these lamps, refer to TM 11–5821–271–15.

***Caution:* If both the amber and green lamps light, do not attempt to operate the equipment. This indicates a malfunction in the equipment, and higher category of maintenance is required.**

j. Turn the VOLUME control maximum counterclockwise, and then turn it approximetely one-quarter turn (90°) clockwise. Adjust the RF SENS control for the desired level of audio output (reception) in the headset or speaker. If additional audio signal is required, vary the VOLUME control. Be sure that the microphone button is released; otherwise, reception is impossible.

2–12. Phone Patch Adjustments

a. General. The telephone line selected for phone patch operation can be any two-wire circuit. If open-wire lines are used, #12 or #14 AWG leads may be used; if lead-covered cable is furnished, 19–, 22–, or 24–gage wire may be utilized. The larger the diameter (or lower the gage number) of the wire used, the greater the distance which may be covered. The line may terminate into a telephone switchboard, such as an SB–22/PT, SB–1315/FT, or SB–933/GT, which allows any of several telephones to communicate through the AN/TRC–146; or the line may terminate into a telephone set such as the TA–312/PT. The end of the telephone line connecting to the AN/TRC–146 terminates at connectors L1 and L2 (fig. 4–1) at the rear of the control console. Considerations on incoming and outgoing communication through the phone patch system are detailed in *b* below.

b. Communication Considerations. When using a telephone set such as the TA–312/PT, the handset may be placed *on-hook* (that is, unused position) for incoming calls; this will not interfere with receipt of calls at the radio set control console. However, for outgoing calls from the telephone, the handset must remain *off-hook* (that is, ready for speaking and listening) because local batteries are required for powering the microphone element in the handset, and the batteries are connected only when the handset is off-hook. The circuits in the control console have been adjusted for correct operation prior to equipment delivery. For different telephone circuits, the hybrid balance may require slight readjustment for best operation. If rebalancing is required, refer to higher category maintenance.

c. Vox Module. The vox circuit (used only in phone patch operation) is adjusted to key the rt unit with a normal level of voice signal at the telephone line input. If adjustment is necessary, higher category of maintenance is required.

2–13. Dipole and Long-Wire Antenna Construction

a. Dipole Antenna. A dipole antenna, which is a directional antenna, can be used for both transmission and reception. Erect a dipole antenna as follows:

Figure 2–4. Receiver-transmitter unit and power unit ventilation doors.

(1) Refer to figure 2–6. Construct the dipole antenna, using approximately #14 or #16 wire.

(2) A dipole antenna is frequency-sensitive, cut in the center, and must be a certain length, depending on the operating frequency of the transceiver. Determine the length by using the following formula:

$$\text{Length (feet)} = \frac{468}{\text{Frequency (Megahertz)}}$$

Example: If the operating frequency is 10 MHz, divide 10 into the constant 468. The answer is 46.8 Therefore, the dipole antenna is 46.8 feet long for a frequency of 10 MHz.

(3) Use 75-ohm coaxial cable or, if this is not available, use two lengths of heavily insulated flexible wire to connect the dipole antenna to the antenna connector on the top of the antenna coupler case. Secure one length of wire firmly to the antenna connector with a clamp (not furnished as part of the AN/TRC–146), and connect the other lead firmly to the ground which grounds the antenna case.

Note. An antenna base adapter (FSN 5820–915–9194) is available in supply channels; it is screwed over the antenna base of the AN/TRC–146 antenna coupler case and has a knurled screw on its top, permitting easy attachment of a lead-in wire from the dipole antenna.

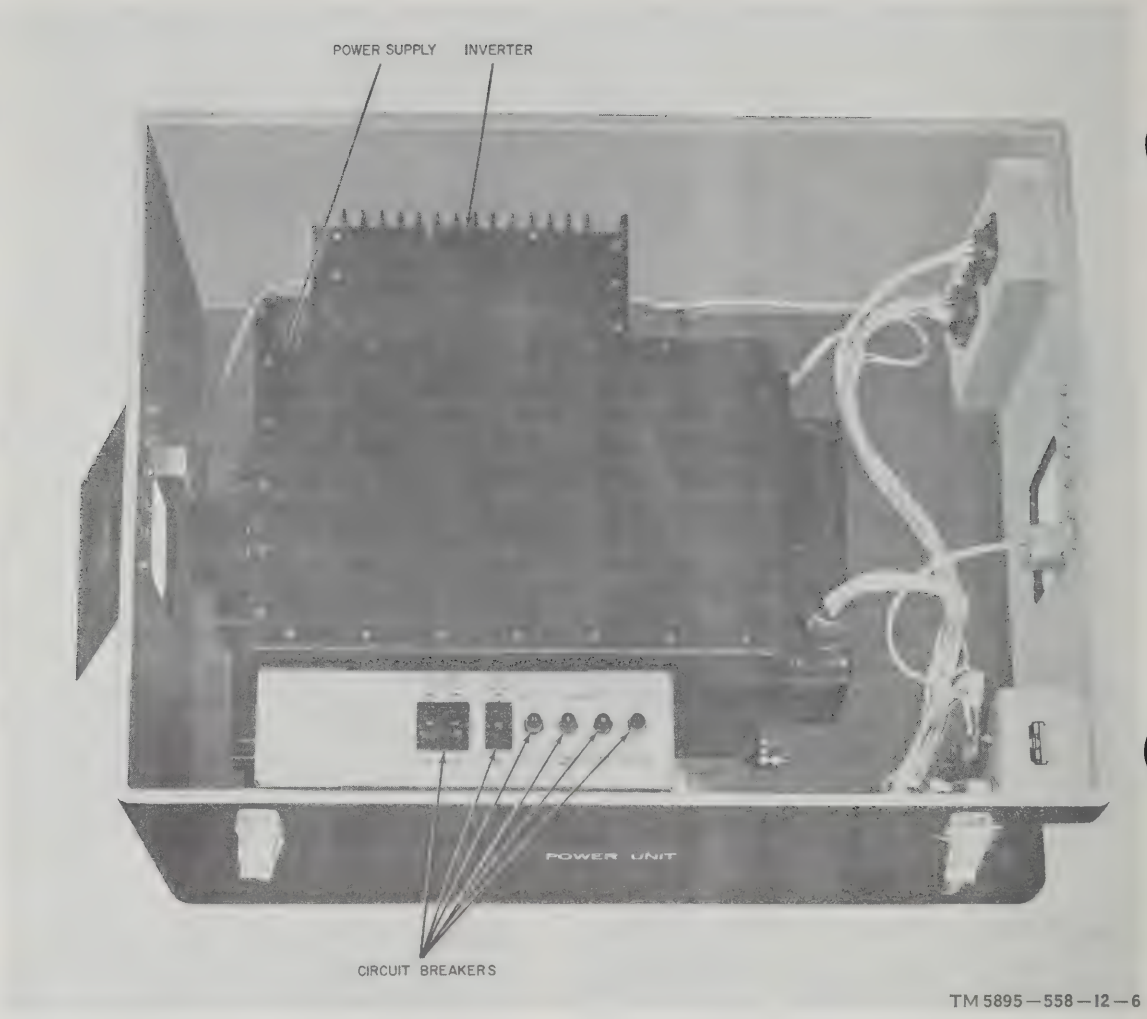

Figure 2–5. Power unit showing power supply, inverter, and circuit breakers.

(4) The antenna must be aimed horizontally in the direction of transmission (or reception). Insure that the antenna is oriented correctly.

b. Long-Wire Antenna. An antenna constructed of a straight length of wire, which is a multiple of one-half a wavelength, is known as a long-wire antenna. The long-wire antenna should be at least 80 feet long and made of approximately #14 or #16 wire. Erect a long-wire antenna as follows:

(1) Locate two poles, trees, or other vertical objects which are at least 80 feet apart. Secure an insulator to both poles or trees, and erect the long-wire antenna between them. Attach another length of wire to one end of the antenna itself for use as a lead-in.

(2) Secure the other end of the lead-in to the antenna base on the top of the AN/TRC–146 antenna coupler

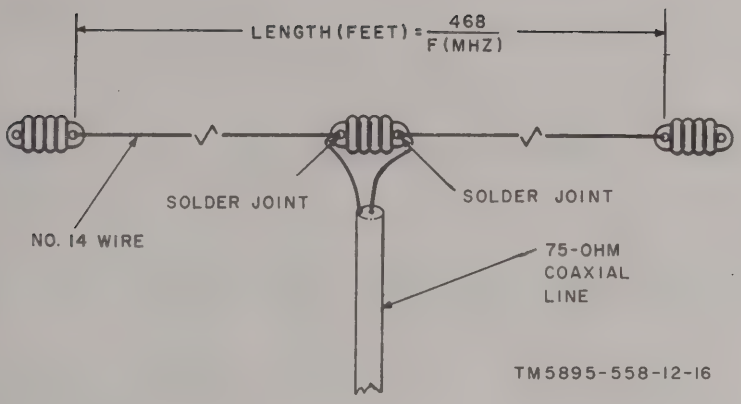

Figure 2–6. Dipole antenna.

case with a clamp (not furnished with the AN/TRC–146).

Note. An antenna base adapt (FSN 5820–915–9194) may be used. Refer to *Note* in *a* (3) above.

(3) Insure that the antenna is insulated from ground.

Note. Other external antennas, which are not a component part of the AN/TRC–146, but may be used with the equipment, are listed in appendix A.

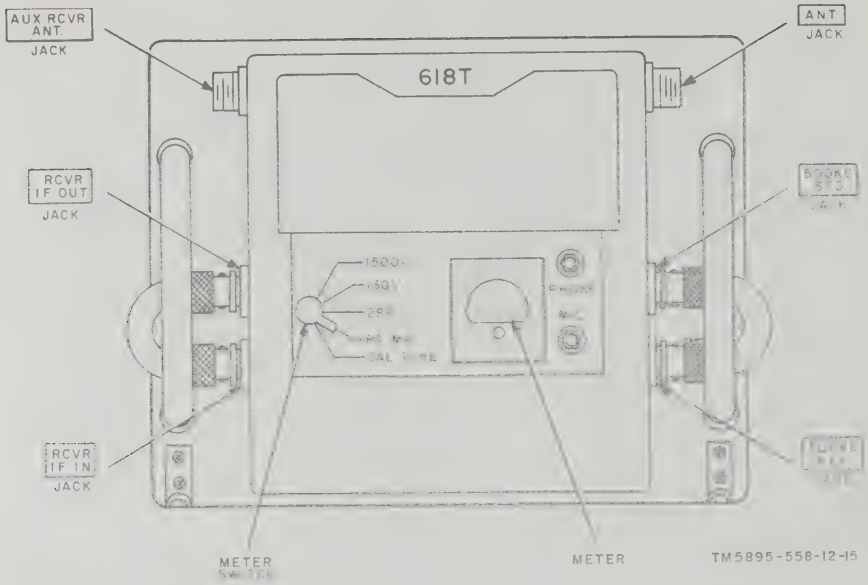

Figure 2–7. Receiver-Transmitter, Radio RT–698/ARC–102, front panel.

CHAPTER 3

OPERATING INSTRUCTIONS

Warning: Before operating this equipment, make certain all requirements of TB SIG 291 are met. When the transceiver is keyed for transmission, 12,000 volts of rf voltage is present on the antenna. Injury or DEATH could result from improper or careless operation.

3–1. Control Console, Operator's Controls, Switches, Indicators, and Jacks (fig. 3–1)

Control, switches, indicator, or jack	Function
ON-OFF switch	Applies power to Radio Set AN/TRC–146.
Power–on lamp	Indicates power is being applied to Radio Set AN/TRC–146.
CW KEY jack	Provides for cw operation if desired.
MIC jack	Microphone connection.
PHONE jack	Headset connection.
SPEAKER-OFF switch	Selects external speaker or headset.
51S-OFF switch	Not used in Radio Set AN/TRC–146.
618T-OFF switch	Selects audio from transceiver.
VOLUME control	Adjusts audio level in headset or speaker.
TUNE lamp (amber)	Indicates automatic tuning of rt unit and antenna coupler.
OPERATE lamp (green)	Indicates automatic tuning is complete and the AN/TRC–146 is ready to operate.
NORMAL-PHONE PATCH switch.	Selects phone patch operation or NORMAL (other) operation.
Frequency control knobs	Select desired frequency.
RF SENS control	Controls transceiver rf level (audio output from transceiver into VOLUME control circuits).
Function switch	Selects desired mode of operation.

3–2. Operation under Usual Conditions

With the equipment in position and the cables connected, the system is ready for operation. Cable connection is illustrated in figure 2–3.

Note. The rt unit and power unit ventilation doors must be open and the power unit circuit breakers on (figs. 2–4 and 2–5).

a. Follow the preliminary adjustment procedures indicated in paragraph 2–11. Depending on the mode of transmission desired, set the function switch to the desired mode (usb, lsb, am., data, or cw); select the desired frequency.

Note. When the frequency control knobs are already set to the frequency which is to be used, turn the 10.kHz frequency control knob (knob which changes dial digit in the *second* digit from the right) *one* digit above or below the desired digit. Wait until the amber (TUNE) lamp goes out and the green (OPERATE) lamp lights, and then turn the knob back to the desired digit. This is necessary when turning on the transceiver and selecting a new mode of operation to insure maximum power output from the transmitter.

b. If phone patch operation is required, refer to paragraph 2–12 for the appropriate procedures and equipment. The vox module (fig. 4–1) is activated only when using phone patch operations.

c. For usb, lsb, or am. transmission, key the transceiver by depressing the switch on the microphone; speak into the microphone. Insure that the NORMAL-PHONE PATCH switch is at NORMAL; this disconnects the vox module phone patch circuits which are not used when hand-keying the transceiver.

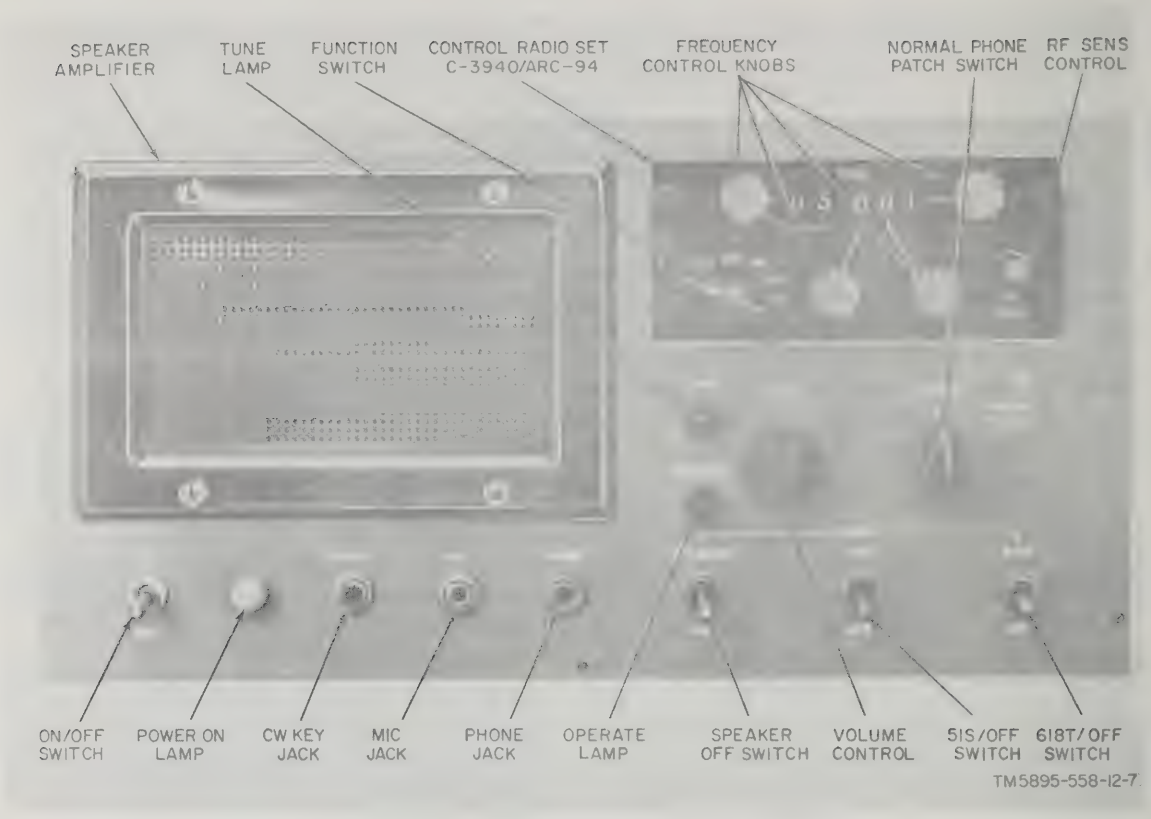

Figure 3–1. Control console, operator's controls, indicators, and jacks.

d. For using the data or fsk mode of operation, external equipment must be connected into the system. A typical application of this mode is the use of a teletypewriter which must be connected through control and power circuits to change teletypewriter signals into frequency-shifted, radio-teletypewriter signals. Refer to the applicable technical manual for further information of fsk techniques.

e. For cw mode of operation, a key is inserted into the CW KEY jack. The appropriate code may then be transmitted by a qualified radio operator.

Caution: **It is possible that during wet or humid weather, sufficient moisture may accumulate on the nylon guy wires supporting the whip antenna to short part or most of the RF signal on the antenna to ground. Take all precautions to insure that the guy wires are free of moisture. If necessary, shut off the transceiver and clean the guy wires whenever signal loss appears or is suspected. Make frequent checks with a distant station to determine if the radiated signal has lost any strength due to moisture on the guy wires.**

3–3. Recognition and Identification of Jamming

Warning: **Set the function switch to OFF before disconnecting or connecting the antenna. When the radio set is operating, 12,000 volts RF can be present at the antenna and antenna coupler. Dangerous voltages may exist on the antenna even when it is turned off. A shorting stick should be used to ground out static charges on the antenna after the set is turned off. Construction and use of a shorting stick is described in TM 11–4000.**

a. General. Under real or simulated tactical conditions, the receiver of the RT–698/ARC–102 may be jammed by the enemy. Enemy jamming is easily done by transmitting a strong signal on the same frequency, thereby making it difficult or impossible to hear the desired signal. Unusual noises or strong interference heard on the receiver may be enemy jamming, signals from a friendly station, noise from a local source, or the receiver may be defective. To determine whether or not the interference is originating in the receiver, disconnect the antenna. If the interference *continues*, the receiver is defective. Enemy jamming signals may be typed as *continuous wave* or *modulated*. A jamming signal may be intended to block a single frequency. This is called *spot* jamming. The enemy may use one or several transmitters to jam a block or band of frequencies. This method is called *barrage* jamming.

b. Continuous-Wave jamming. Transmitted as a steady carrier. Beats with another signal and procedures a steady tone in the headset. May also be keyed by using a random on and off signal or using actual code characters keyed at the same rate or a little faster than the signal being received.

c. Modulated Jamming. May consist of noise, laughter, singing, music, various tones, or almost any unusual sound, or may be a combination of these sounds. Various types of modulated jamming signals are explained below.

(1) *Spark.* One of the simplest, most effective, and most easily produced jamming signals. Sounds very rough, raspy, and sometimes like an electric motor with sparking brushes running. The spark signal is very broad; therefore, it will interfere with a large number of communication channels.

(2) *Sweepthrough.* The result of sweeping or moving a carrier back and forth across a frequency at a slow or rapid rate. The numerous signals of varying amplitude and frequency produce a sound similar to that of a low-flying airplane passing overhead. Sweep through jamming is effective over a broad range of frequencies. When it is varied rapidly, it is effective against all types of voice signals.

(3) *Stepped tones or bagpipes.* Usually consists of several separate tones. The tones are transmitted in the order of increasing and then decreasing pitch, repeated over and over. The audible effect is like the sound of a Scottish bagpipe.

(4) *Noise.* Noise is random both in amplitude and frequency and is one of the better types of jamming modulation. It produces a sound similar to that of a receiver not tuned to a station with volume or gain control turned to maximum.

(5) *Gulls.* Consists of quick rise and slow fall of a variable audiofrequency. The sound is similar to the cry of the sea gull.

(6) *Tone.* Consists of a single audiofrequency of unvarying tone. If produces a steady howl in the headset. Another use of tone is to vary it slowly, producing a howling sound of varying pitch.

3–4. Antijamming

When it is known that a receiver is being jammed, the operator will notify the immediate superior officer at once, and continue to operate the equipment. To provide maximum intelligibility of jammed signals, follow the operational procedure below:

a. Operate the receiver as outlined in paragraphs 2–11 and 3–2.

b. Change frequency slightly on either side of the desired frequency. This action may cause some separation of the desired signal and the jamming signal.

c. Vary the RF SENS control. This action may reduce the jamming signal enough to permit the weaker desired signal to be heard.

d. Vary the VOLUME control. The level of the desired signal may be raised enough to be heard.

e. Change sidebands. However, this may cause a loss of signal if the other station does not change its sideband mode.

f. If the above procedures do not provide sufficient signal separation for operation, change to the alternate frequency and alternate call sign.

3–5. Stopping Procedure

Note. The stopping procedure for standby condition and for shutdown status are the same.

a. Turn the ON-OFF switch (fig. 3–1) to OFF. The power-on lamp will be extinguished.

b. Turn off the following switches:

(1) SPEAKER-OFF.
(2) 618T-OFF.
(3) Function.

Note. The 51S–OFF switch should be at OFF, although it is not used in Radio Set AN/TRC–146.

c. Disconnect any of the following which may be plugged into the control console:

(1) Microphone.
(2) Headset (PHONE jack).
(3) Key (CW KEY jack).

d. Remove the cover from the power unit case (fig. 2–5), and turn off the following circuit breakers:

(1) DC POWER SUPPLY 115/230 VAC.
(2) 618T–3 115 VAC 400 CPS.
(3) R/T (28 VDC).
(4) CONT 618T–3 (28 VDC).
(5) POWER (28 VDC).
(6) INVERTER (28 VDC).

e. Replace the cover and secure it.

f. Close the ventilation doors (fig. 2–4) on both ends of the rt unit and the power unit.

g. Secure the loose items, such as the microphon, in the proper case. Refer to paragraph 1–6.

h. If required, disassemble the antenna and store it in the proper case. Replace and secure covers on cases. Equipment disassembly is described in paragraph 5–1.

3–6. Preparation for Transport

Radio Set AN/TRC–146 consists of five cases which house all required equipment. When completely disassembled and with all covers secured, the cases may be easily moved by as few as two men. The power unit case is the heaviest; it weighs 136 pounds. Each of the other cases weighs less than 90 pounds. The equipment may be loaded into an airplane or helicopter, or stored in a jeep vehicle, truck, or trailer. Total weight of all five cases is 415 pounds. This figure is given so that the total weight capability of the carrying vehicle may be considered when relocating the AN/TRC–146. If a portable power supply will be required for field operation, this weight figure must also be calculated. If required, external antennas, which feature high gain and better radiation patterns than a whip antenna, must be calculated into the weight load of the carrying vehicle. A partial listing of these external antennas is given in Appendix A. For disassembly procedures, refer to paragraph 5–1. For assembly procedures, refer to paragraphs 2–9 and 2–10.

CHAPTER 4

OPERATOR AND ORGANIZATIONAL MAINTENANCE

Warning: **During removal, disassembly, erection, assembly, or repair of Radio Set AN/TRC–146 or the whip antenna, conform to all safety requirements of TB SIG 291. Injury or DEATH could result from failure to comply with safe practices.**

Section I. OPERATOR MAINTENANCE

4–1. General

The maintenance duties assigned to the operator of Radio Set AN/TRC–146 are listed below together with a reference to the paragraphs covering the specific maintenance function.

a. Tools, test equipment, and materials required (para 4–2).

b. Preventive maintenance (para 4–3).

c. Daily preventive maintenance checks and services (para 4–4).

d. Daily preventive maintenance checks and services chart (para 4–5).

4–2. Tools, Test Equipment, and Materials Required

No special tools or test equipment are required for operator maintenance. However, the following materials are required:

a. Line-free cleaning cloth.

b. Cleaning Compound (FSN 7930–395–9542).

c. Soft-bristled brush.

4–3. Operator Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedure given in paragraphs 4–4 and 4–5 covers routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and service chart (para 4–5) outlines functions to be performed at specific intervals. These checks and services are to maintain Radio Set AN/TRC–146 in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and the normal conditions; the *References* column lists the paragraphs that contain detailed repair or replacement procedure. If the defect cannot be remedied by the operator, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38–750.

4–4. Operator Daily Preventive Maintenance Checks and Services

Perform the maintenance functions indicated in the daily preventive maintenance checks and services chart (para 4–5) daily or under the special conditions listed below.

a. When the equipment is initially received.

b. When the equipment has been returned from higher category maintenance.

c. At least once each week if the equipment is maintained in a standby condition.

4–5. Operator Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Completeness	Check to see that the AN/TRC–146 is complete.	Para 1–6.
2	Radio Set	Clean dirt and moisture from the antenna, microphone, jacks, plugs, and control console front panel.	4–10.
3	Catches and latches	Check for broken, missing, or loose catches and latches, or other damage.	None.
4	External cables	Check for cuts, cracked, or gouged jacks, fraying, bad bruises or kinks. Replace if damaged.	None.
5	External plugs and receptacles.	Check electrical plugs and receptacles for breakage and firm seating. Replace if damaged.	None.
6	Controls	Check control console controls for operation. Tap controls lightly for evidence of looseness. Replace damaged controls.	None.
7	Antenna	Check antenna mast to see if it is straight and vertical. Check individual elements for damage. Check guy ropes to see that they are secure, reasonably taut, and not damaged.	None.
8	Operation	Check for normal operation and complete functional response or condition. Report any unusual noise within the equipment as a possible defect.	Paras 3–2 and 3–3.
9	Exterior surfaces	Check for cleanliness of the exterior part of the units.	None.
10	Metal surfaces	Check all exposed metal surfaces for rust or corrosion.	None.
11	Canvas and leather items.	Check canvas bag and leather straps for mildew, tears, and fraying.	None.
12	Switches, knobs, jacks, plugs.	Check switches, knobs, jacks, and plugs for looseness.	None.
13	Air filter	Inspect the air filter in the power supply. If dirty, higher category maintenance is required.	None.
14	Ventilation doors	Check the ventilator doors on the power unit and rt unit for proper operation and ease of opening and closing.	None.
15	Lamps	Set ON-OFF switch to ON. Adjacent lamp lights. Select a new frequency; momentarily key the transmitter, the TUNE lamp lights for a few seconds and then the OPERATE lamp lights. If lamps are burned out, higher category maintenance is required.	Para 4–14.

Section II. ORGANIZATIONAL MAINTENANCE

4–6. General

The maintenance duties assigned to the organizational maintenance repairman of Radio Set AN/TRC–146 are listed below together with a reference to the paragraphs covering the specific maintenance function.

a. Tools, test equipment, and materials required (para 4–7).

b. Quarterly preventive maintenance checks and service (para 4–8).

c. Quarterly preventive maintenance checks and services chart (para 4–9).

d. Cleaning (para 4–10).

e. Lubrication (para 4–11).

f. Troubleshooting (para 4–14).

g. Continuity checks (para 4–15).

h. Replacement and repairs (para 4–16).

4–7. Tools, Test Equipment, and Materials Required

The following tools and test equipment are required in addition to the materials cited in paragraph 4–2:

a. Tool Kit, Electronic Equipment TK–101/G.

b. Multimeter AN/URM–105.

4–8. Organizational Quarterly Preventive Maintenance Checks and Services

a. Perform the maintenance functions indicated in the quarterly preventive maintenance checks and services chart (para 4–9) in addition to those given in the daily preventive maintenance checks and services chart (para 4–5). Preventive maintenance is the responsibility of all categories of maintenance concerned with the equipment, and includes the inspection, testing, and repair of units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of Radio Set AN/TRC–146 are made quarterly, or monthly if directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38–750.

c. Equipment in limited storage (requiring service before operation) does not require quarterly (or monthly) preventive maintenance.

d. The quarterly preventive maintenance checks and services chart contains functional tests for the AN/TRC–146. These tests, in addition to the requirements in *a* above, should be performed when the equipment is initially received and at any time that trouble is suspected. If trouble is encountered in performing the functional tests, visually inspect the equipment as detailed in paragraph 4–13. If trouble still exists, refer to the procedure in the troubleshooting chart that corresponds to the test in which the trouble occurred. The steps are to be performed in numerical order.

4–9. Organizational Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Pluckout items	Inspect seating of readily accessible pluckout items; tubes, lamps, fuses, and connectors.	None.
2	Relays and circuit breakers.	Inspect relays and circuit breakers for loose mounting, bad contacts, misalignment of contacts and springs.	None.
3	Capacitors	Inspect variable capacitors for dirt, moisture, and loose mounting.	None.
4	Resistors, bushings, and insulators.	Inspect resistors, bushings, and insulators for cracks, chips, blistering, moisture, and discoloration.	None.

Sequence No.	Item to be inspected	Procedure	References
5	Cases	Check inside of cases for moisture accumulation due to condensation.	None.
6	Interior	Clean and tighten switches, terminal blocks, blowers, relay cases, and interiors of chassis and cabinets not readily accessible from exterior.	None.
7	Control console vox module.	Check circuit board for cracks, loose components, and loose or broken etchings. Check solder connections for corrosion, excessive solder, and possible short circuits. Replace module if necessary.	Para 4–16.
8	Antenna kit	Inspect canvas bag, guy anchors, guy rope, and guy fitting for corrosion, rust, mildew, and wear. Replace item if necessary.	None.
9	Antenna case	Inspect case and strap for wear. Replace or repair as necessary.	None.
10	Transformers, chokes, and potentiometers.	Inspect transformers, chokes, and potentiometers for overheating.	None.
11	Antenna	Inspect antenna for corrosion, loose fitting, or damaged insulator.	None.
12	Lubrication	Lubricate in accordance with lubrication instructions for the equipment.	Para 4–12.
13	Interlocks	Check for shorted, improperly installed, loose, dirty, or broken interlocks.	None.
14	Fuses	See that all operating fuses are of the correct value (fig. 4–1). Check spare fuses for proper value and quantity.	None.

Warning: The following maintenance procedures require the breaking of radio silence. This technical manual does not authorize the breaking of radio silence imposed by any command. Death to command personnel and severe damage to equipment and materiel may result.

15	Inverter and transceiver	Refer to figure 2–7. Place meter switch at each position below and observe indications.	None.

Positions	Indication
28V	Monitor meter indicates in red area.
130V	Monitor meter indicates in red area.
PA MA	Key the microphone; monitor meter indicates approximately 300 ma.

Sequence No.	Item to be inspected	Procedure		References
		Positions	Indication	
		1500V	Key the microphone; monitor meter indicates in red area.	
		CAL TONE	1,000–cps tone is heard in headset.	
16	Antenna coupler	Check the antenna coupler in accordance with TM 11–5821–271–15.		None.
17	Control, Radio Set C–3940/ARC–94.	Check Control, Radio Set C–3940/ARC–94 in accordance with TM 11–5821–248–12.		None.
18	Operation	Check for normal operation		None.
		Note. The rt unit and power unit ventilation doors must be open and the power unit circuit breakers at ON.		
19	ON-OFF switch	Set ON-OFF switch to ON. Adjacent lamp lights.		None.
20	Function switch	Set function switch on subpanel Control, Radio Set C–3940/ARC–94 to the desired mode of operation. Allow a 2–minute warmup period before keying the transmitter.		Para 4–14.
21	SPEAKER-OFF switch	Set SPEAKER–OFF switch to SPEAKER if desired.		Para 4–14.
22	618T-OFF switch	Set the 618T-OFF switch to 618T.		Para 4–14.
23	NORMAL-PHONE PATCH switch.	Set NORMAL-PHONE PATCH switch to NORMAL. Audio is heard through speaker or headset, whichever is selected.		Para 4–14.
24	Frequency control knobs	Set the frequency control knobs on subpanel Control, Radio Set C–3940/ARC–94 to the desired frequency.		Para 4–14.
25	Microphone button	Momentarily push the microphone button.		Para 4–14.
		Note. The TUNE lamp lights while the system is automatically tuning to the selected frequency. When the TUNE lamp goes off and the OPERATE lamp lights, the system is ready for operation.		
26	Operation using phone patch.	Perform sequence No. 15 through 28, and then establish communications with a distant station.		Para 4–14.
27	NORMAL-PHONE PATCH switch.	Set the NORMAL-PHONE PATCH switch to PHONE PATCH. Test the phone patch by talking to the distant telephone (or switchboard).		Para 4–14.

4–10. Cleaning

Inspect the exterior of Radio Set AN/TRC–146. The exterior surfaces should be free of dust, dirt, grease, and fungus. If necessary, perform the procedures listed below.

a. Remove dust and loose dirt with a clean, soft cloth.

Warning: **Cleaning compound is flammable and its fumes toxic. Provide adequate ventilation. Do not use near flame.**

b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust or dirt from plugs and jacks with a brush.

Caution: **Do not press on meter faces (glass) when cleaning; the meter may be damaged.**

d. Clean the front panels, meters, and control knobs; use a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

4–11. Lubrication

a. Lubricate the transceiver in accordance with TM 11–5821–248–12.

b. Lubricate the antenna coupler in accordance with TM 11–5821–271–15.

c. No lubrication is required for the remaining components of the AN/TRC–146.

Section III. TROUBLESHOOTING

4–12. General

Troubleshooting of this equipment is based upon the operational check contained in the quarterly preventive maintenance checks and services chart (para 4–9). To troubleshoot the equipment, perform all functions starting with item number 22 in the quarterly preventive maintenance checks and services chart (para 4–9) and proceed through the items until an abnormal condition or result is observed. When an abnormal condition or result is observed, note the item number and turn to the troubleshooting chart (para 4–14). Perform the checks and corrective measures indicated in the troubleshooting chart. If the corrective measures indicated do not result in correction of the trouble, higher category maintenance is required. Paragraphs 4–15 contains information that is supplementary to the chart. When a trouble symptom indicates the use of additional procedures, reference to these paragraphs will be made in the *Checks and corrective measures* column of the troubleshooting chart.

4–13. Visual Inspection

When the equipment fails to perform properly, turn off the power and check the items listed below. Do not check any items with the power on.

a. See that the switches and controls have been set properly.

b. See that all cables have been connected properly (fig. 2–3).

4–14. Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
1	No indication of power applied to the radio set is apparent.	*a.* Power-on lamp fails to light.	*a.* Lamp is open. Replace it as required.
		b. ON-OFF switch does not allow power to be applied to the radio set.	*b.* Switch is open. Remove control console panel from case (para 4–16*d*), and examine switch and wires soldered to switch. If an open circuit is detected or suspected, replace control console panel in case (para 4–16*d*), and refer to higher category of maintenance.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
		c. Open wire(s) in 100–foot control cable between control console and rt unit.	*c.* Perform continuity checks (para 4–15). If unwanted shorts between wires, or open in wires, are found, replace the cable; forward the defective cable to a higher category of maintenance.
		d. Circuit breakers in power unit (fig. 2–5) are open.	*d.* Set open circuit breakers to ON; if this fails, either replace power unit or forward the power unit to a higher category of maintenance.
		e. Ventilation interlocks on power unit and rt unit are closed.	*e.* Open ventilation doors (fig. 2–4). If this fails to activate these units, higher category of maintenance is required.
		f. Inoperative power supply or inverter in power unit case.	*f.* Refer to higher category of maintenance.
		g. One or more voltages in the transceiver are O volt.	*g.* Open cover on rt unit (fig. 2–4) by loosening the four latches. Apply power to the rt unit, and observe the front panel meter readings (para 4–9, sequence No. 15). Refer to figure 2–7. If abnormal readings are noticed refer to higher category of maintenance.
		h. Antenna coupler remains in the FAULT position.	*h.* Refer to TM 11–5821–271–15. Forward to higher category of maintenance.
2	Power is applied to the radio set, but function switch (fig. 3–1) cannot select any of the five modes of operation.	*a.* 100–foot control cables (rt unit to console, and rt unit to coupler) have open wires, or shorts between wires.	*a.* Perform continuity checks as outlined in paragraph 4–15. Replace any defective cable, and forward the defective cable to higher category of maintenance.
		b. Open or short exists in Control, Radio Set C–3940/ARC–94.	*b.* Remove the control console panel from the case (para 4–16*d*). Remove the C–3940/ARC–94 (para 4–16*f*). Examine the connector at the rear (J1) for opens, shorts, bent pins, or overheating. Forward the C–3940/ARC–94 to a higher category of maintenance. If possible, replace the C–3940/ARC–94 with a known good unit; replace the control console panel in the case.
3	Power is applied to the radio set, but no audio is heard in the speaker (or headset).	*a.* RF SENS control (fig. 3–1) on Control, Radio Set C–3940/ARC–94 is open or intermittent.	*a.* Turn the NORMAL-PHONE PATCH switch to NORMAL. Turn the 51S-OFF switch to OFF, and the 618T-OFF switch to 618T. A headset (not a component part of the AN/TRC–146 is required

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
			for this procedure. Insert the headset plug into the PHONE jack. Insure that power is applied to the radio set and that the power-on lamp is on. Vary the RF SENS control and listen for audio noise in all five modes of the function switch; some background audio noise or reception should be heard in at least one of the modes. If no audio is detected, open the top of the rt unit case, and insert the headset plug into the transceiver front panel (fig. 2–7); vary the RF SENS control and listen for audio noise. If none is heard, depress the front panel meter switch to CAL TONE. A 1–kHz tone should be heard. If no tone or any audio is present, the trouble is in the transceiver, and it must be forwarded to a higher category of maintenance. If a tone is heard, remove the headset plug and insert it into the PHONE jack of the control console (fig. 3–1). Depress the CAL TONE switch on the transceiver front panel; if no tone is heard, close the rt unit cover and forward the control console to higher category maintenance.
		b. VOLUME control or SPEAKER-OFF switch is open; or 618T-OFF switch is open.	*b.* Turn SPEAKER-OFF switch to SPEAKER, and VOLUME control to minimum (counterclockwise). Turn RF SENS control to maximum (clockwise). Turn up the VOLUME (clockwise) and listen for audio noise in all five modes of the FUNCTION switch. If none is heard, open the cover of the rt unit and depress the CAL TONE switch on the transceiver front panel. If no speaker audio is heard, forward the control console for higher category maintenance.
		c. NORMAL-PHONE PATCH switch is open.	*c.* Remove control console from case (para 4–16*d*). Inspect the rear of the switch for signs of overheating or open connections. Forward control console to a higher category of maintenance.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
4	TUNE and OPERATE lamps fail to turn on when microphone switch is depressed.	*a.* Control cable (100 ft) (rt unit to console) is open.	*a.* Check continuity (para 4–15). Replace if necessary.
		b. Control cable (100 ft) (rt unit to coupler) is open.	*b.* Check continuity (para 4–15). Replace if necessary.
		c. Lamp is open	*c.* Replace lamp (para 4–16).
5	TUNE lamp stays on, but OPERATE lamp remains off.	*a.* Control cable (100 ft) (rt unit to console) is open.	*a.* Check continuity (para 4–15). Replace if necessary.
		b. Control cable (100 ft) (rt unit to coupler) is open.	*b.* Check continuity (para 4–15). Replace if necessary.
		c. Electrical or mechanical malfunction in coupler.	*c.* Refer to higher category of maintenance.
6	OPERATE lamp remains on, and TUNE lamp never lights.	*a.* Control cable (100 ft) (rt unit to console) is open.	*a.* Check continuity (para 4–15). Replace if necessary.
		b. Control cable (100 ft) (rt unit to coupler) is open.	*b.* Check continuity (para 4–15). Replace if necessary.
		c. Electrical or mechanical malfunction in coupler.	*c.* Refer to a higher category of maintenance.
7	Both the TUNE and OPERATE lamps remain on at all times.	Electrical or mechanical malfunction in coupler.	Refer to higher category of maintenance for repairs.
8	Phone patch circuits are inoperative.	*a.* Vox AMP fuse F2 at back of control coupler is open.	*a.* Inspect fuse. Replace if necessary.
		b. Control cable (100 ft) (rt unit to console) is open.	*b.* Check continuity (para 4–15). Replace if necessary.
		c. Vox module is open	*c.* Replace vox module (para 4–16*e* and fig. 4–1).

4–15. Continuity

If trouble is suspected with the intercabling connections, make a continuity check of the cables in accordance with the following chart.

Cable No.	From pin No.	To pin No.
Power cable (power unit to rt unit) (10 ft).	P7–A	P3–A
	–D	–D
	–F	–F
	–B	–B
	–C	–C
	–G	–G
	–H	–H
	–I	–I
Control cable (rt unit to console) (100 ft).	P5–H	P1–H
	–J	–J
	–K	–K
	–L	–L
	–M	–M
	–N	–N
	–P	–P
	–R	–R
	–S	–S
	–T	–T
	–U	–U

Cable No.	From pin No.	To pin No.
	-V	-V
	-W	-W
	-X	-X
	-Z	-Z
	-a	-a
	-b	-b
	-c	-c
	-d	-d
	-e	-e
	-f	-f
	-g	-g
	-r	-r
	P5-n	P5-n
	-h	-h
	-Y	-Y
	-i	-i
	-E	-E
	-F	-F
	-G	-G
	-C	-C
	-D	-D
	-A	-A
	-B	-B
	-j	-j
	-k	-k
	-p	-p
	-m	-m
Rf cable (100 ft)	P4 center conductor	P10 center conductor
Control Cable (rt unit to coupler) (100 ft).	P2-C	P6-C
	-N	-N
	-L	-L
	-M	-M
	-A	-A
	-B	-B
	-F	-F
	-G	-G
	-H	-H
	-E	-E
	-J	-J
	-K	-K
	-P	-P
	-D	-D

4-16. Repairs

a. Replacement of Lamps (fig. 3-1).

(1) Rotate the lamp jewel counterclockwise and remove it from the lamp assembly.

(2) Remove the defective lamp from the jewel holder.

(3) Replace the defective lamp with a new one of identical rating.

b. Replacement of Knobs (fig. 3-1).

(1) Set the control or switch to its extreme counterclockwise position.

(2) Loosen the setscrew on the defective knob, and remove the knob from its shaft.

Caution: **Do not overtighten. Damage to component may result.**

(3) Replace the new knob on its shaft and tighten the setscrews.

c. Replacement of Fuses (fig. 4-1).

(1) Press in on the fuseholder cap and rotate it counterclockwise to unlock it.

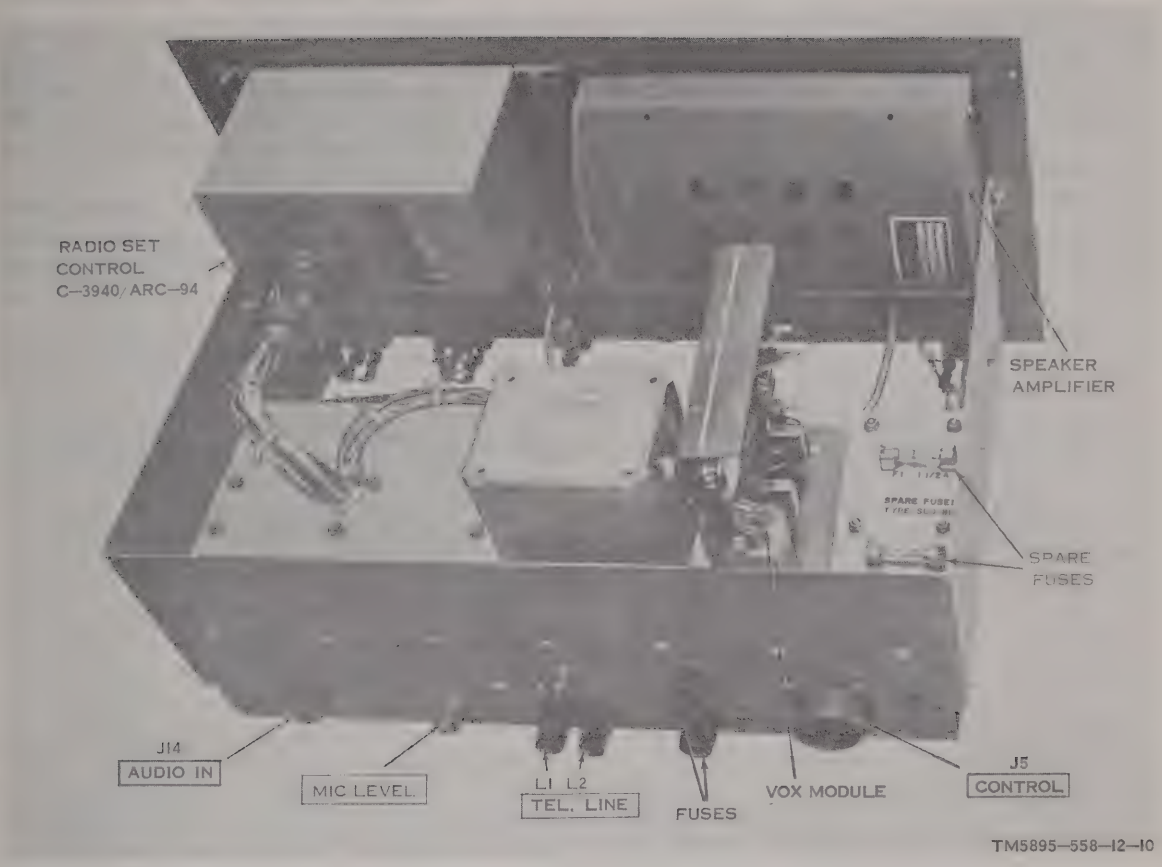

Figure 4–1. Control console, inside view showing vox module, fuses, and spare fuses.

(2) Pull the fuseholder cap and the fuse out of the fuseholder.
(3) Remove the defective fuse from the fuseholder cap.
(4) Replace the defective fuse with a new one of the same rating.
(5) Insert the fuse and fuseholder cap in the fuseholder. Push in on the fuseholder cap and rotate it clockwise to lock it.

d. Removal and Replacement of Control Console Panel.

(1) *Removal* (fig. 3–1).
(*a*) Disconnect all cables.
(*b*) Remove the six screws around the edge of the panel. Lift the panel out of the case.
(*c*) Spare fuses are located near the vox module (fig. 4–1). If spare fuseholder is empty, insert the fuse(s) with the value stamped on the chassis.

(2) *Replacement* (fig. 3–1).
(*a*) Replace the control console panel into the control console case.

Caution: **Do not overtighten. Damage to component may result.**

(*b*) Replace and tighten the six securing screws.
(*c*) Reconnect all cables (fig. 2–3).

e. Replacement of Control Console Vox Module (fig. 4–1).

(1) Remove control console from its case (*d*, above).
(2) Remove screws holding vox module in place.

(3) Remove vox module and replace with a good module.
(4) Replace screws in vox module to secure in place.
(5) Replace control console in its case.

f. Replacement of Control, Radio Set C-3940/ARC-94 (fig. 3-1 and 4-1).

(1) Remove control console from its case by loosening the six screws around the outer edge of the front panel.
(2) Disconnect the plug connected to J1 at the rear of the radio set control unit by twisting it counterclockwise and lifting off.
(3) With a screwdriver, loosen the four quarter-turn screws around the outside of the radio set control unit front panel, and lift out the unit through the front of the control console.
(4) To replace the radio set control, place into position from the control console from panel, and secure the four quarter-turn fasteners with a screwdriver.
(5) Connect the power and control cable plug into jack J1 at the rear of the radio set control unit, and tighten the plug by twisting the outside ring clockwise until it clicks shut.
(6) Replace the control console in the case.

Caution: **Do not overtighten. Damage to components may result.**

(7) Tighten the six screws which secure the control console to the case.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5–1. Disassembly of Equipment

The following instructions are recommended as a guide for preparing Radio Set AN/TRC–146 for shipment and storage.

a. Remove the antenna as follows:
- (1) Loosen the guy ropes.
- (2) Unscrew the antenna base from the antenna coupler.
- (3) Disconnect ground end of one guy rope and carefully let the whip antenna down to ground.
- (4) Disconnect all guy ropes, coil them, tie them neatly, and store inside the antenna coupler (fig. 5–1).
- (5) Slip the guy fitting off the antenna and store it inside the antenna coupler (fig. 5–1).
- (6) Disconnect all sections of the antenna and store them in the antenna case (fig. 2–2).
- (7) Remove the guy anchors from the ground and place them inside the canvas bag. Store inside the antenna coupler (fig. 5–1).
- (8) Store the antenna base inside the antenna coupler (fig. 5–1).

b. Remove the external cables as follows:
- (1) Disconnect all external cables, and store them inside antenna coupler and accessory case (fig. 5–1 and 5–2).
- (2) Place protective cap over all connectors.
- (3) Store control console in the acessory case (fig. 5–2).
- (4) Store the microphone inside the accessory case (fig. 5–2).

c. Remove the ground rods as follows:
- (1) Disconnect ground cables from the antenna coupler, power unit, and rt unit; store them inside the antenna coupler (fig. 5–1).
- (2) Remove the three ground rods from the ground, and store them in the antenna case.

d. Place filler material inside the antenna coupler and accessory case to keep minor components from shifting position while in transit.

e. Place the covers on the antenna case and accessory case.

f. Close the ventilation doors on the power unit and rt unit (fig. 2–4).

5–2. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored (*b* and *c* below). Adapt the procedures outlined below whenever possible. The information concerning the original packaging (para 2–1) will also be helpful.

a. Material Requirements. The following materials are required for packaging Radio Set AN/TRC–146. For stock numbers of materials, consult SB 38–100.

Material	Qty	Dimensions (in.)
Protective cushions	8	221–1/2 x 29 x 2
	8	16–1/2 x 33 x 2
	8	16–1/2 x 22–1/2 x 2

Material	Qty	Dimensions (in.)
Corrugated cartons	4	17 x 25 x 34
	1	7 x 7 x 60
Grade A paper	4	42 x 70
	1	30 x 60
Barrier bag	4	51 x 84
	1	40 x 75
Waterproof paper	4	55 x 86
	1	44 x 77
Plywood box	1	29 x 37 x 64
Desiccant.		
Pressure-sensitive tape	1	500 x 3
Metal straps	3	135 x 3/4 x 2/100
Cotton twine	1 roll	

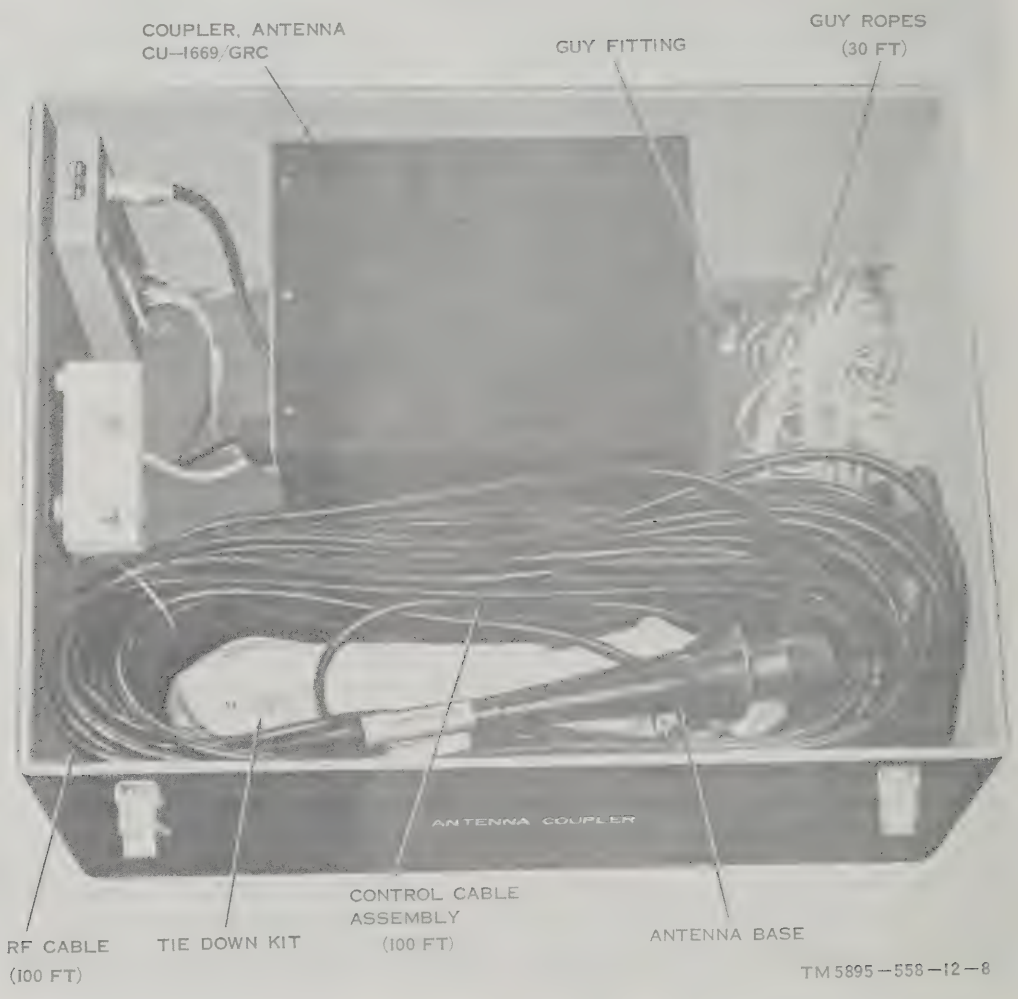

Figure 5–1. Antenna coupler, showing minor components stored for shipping.

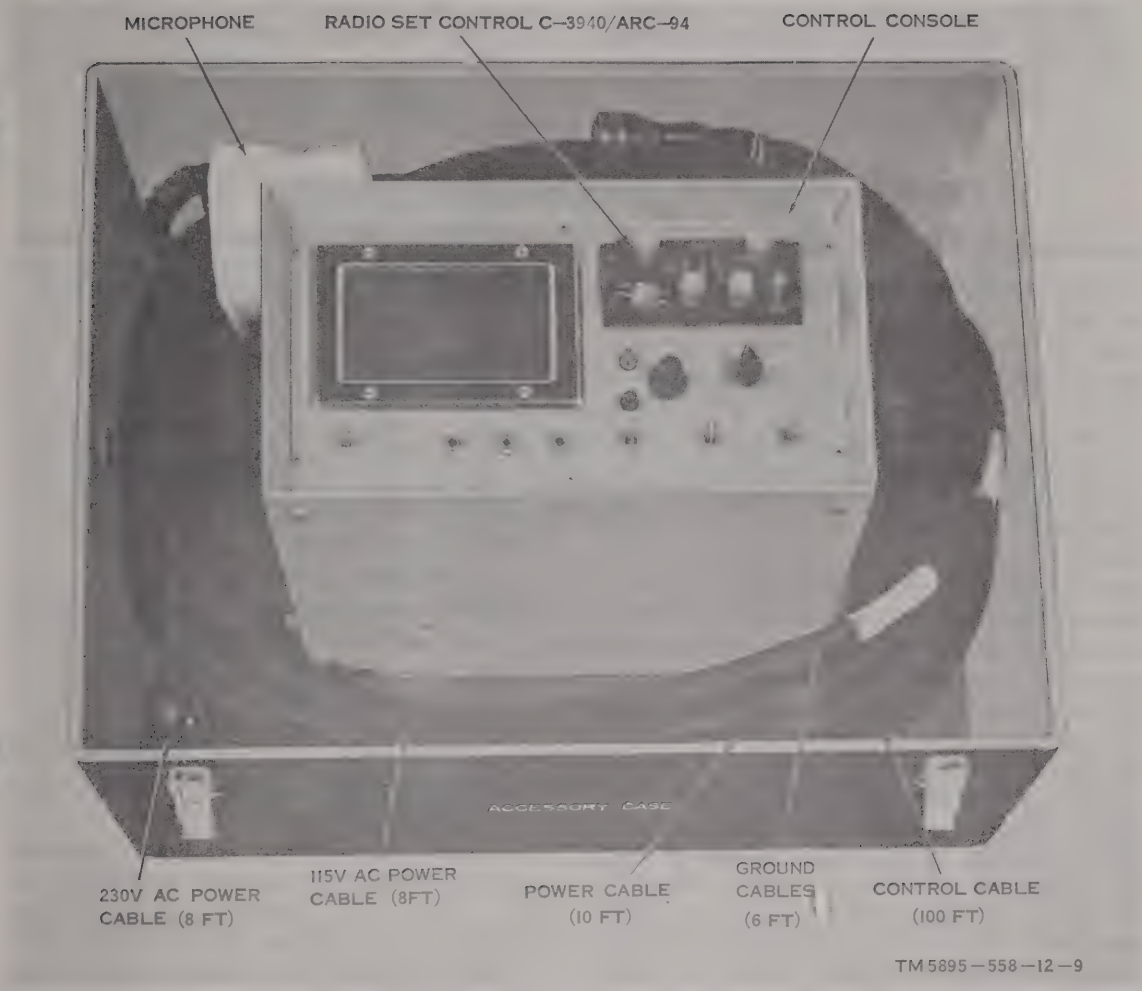

Figure 5-2. Accessory case, showing minor components stored for shipping.

b. Packaging. The items of Radio Set AN/TRC-146 are to be packaged as outlined below.

(1) *Minor components* (figs. 5-1 and 5-2). Wind each cable assembly into a coil of convenient dimensions and tie with cotton twine. Store the minor components in accordance with paragraph 5-1.

(2) *Major components* (figs. 2-1 and 2-2). Wrap the major component in Grade A paper and place in a corrugated carton with a protective cushion in the bottom of the carton. Place protective cushions all around the major component and one protective cushion on top. Secure the top of the corrugated carton with pressure-sensitive tape. Place the corrugated carton in a barrier bag and wrap with waterproof paper.

c. Packing.

(1) Pack all four consolidated packages in one plywood box. Brace across the top with a 2- by 4-inch wooden brace.

(2) Place the antenna case on top along one side and brace in position with a 2- by 4-inch wooden brace.

(3) Place top on wooden box and nail in place.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

5–3. Authority for Demolition

a. The demolition procedures in paragraph 5–4 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the AN/TRC–146 will be accomplished only upon the order of the commander.

b. Thorough demolition of the AN/TRC–146 will be accomplished through the use of procedures outlined in International Standardization Agreement STANAG 2113, "Destruction of Military Technical Equipment." Methods of destruction should achieve damage to equipment and essential spare parts so that it will not be possible to restore the equipment to a usable condition in the combat zone either by repair or cannibalization. The reporting of the destruction of equipment is to be done through command channels.

c. If a destruction plan is not provided by higher authority, one should be prepared by the organization using the equipment. In this plan, personnel are assigned specific destruction tasks, but all personnel in the using organization should be familiar with all aspects of the complete destruction plan. The plan must be adequate and easily carried out in the field and must provide for as complete a destruction as available time, equipment, and personnel will permit. Because the time required for complete destruction may not always be available, the destruction plan must establish priorities so that essential parts of the equipment will be destroyed in the order of their importance. Systematic destruction of the same important units of equipment of a given type will prevent the enemy from learning the important features of the equipment by cannibalization of partially destroyed equipment. Adequate destruction of some of the AN/TRC–146 should always be accomplished rather than partial destruction of all units. Which of the methods listed in paragraph 5–4 to be used depends on the time available for destruction.

5–4. Methods of Destruction

a. Destruction Priority. STANAG 2113 outlines the general priorities for any equipment which is to be destroyed. These priorities, as applied to the AN/TRC–146, are listed below:

(1) Receiver-Transmitter, Radio RT–698/ARC–102.

(2) Control console, to include Control, Radio Set C–3940/ARC–94.

(3) Power supply.

(4) Power inverter.

(5) Whip antenna (all elements).

(6) All cables and connectors.

(7) Microphone, handset, headset, and telegraph key.

b. Smash. Smash the controls, resistors, capacitors, switches, antenna, and other interior parts; use sledges, hammers, axes, crowbars, and other heavy tools.

c. Cut. Cut the cords, cables, and wiring; use axes, handaxes, or machetes.

d. Burn. Burn the cords, wiring, manuals, and components; use gasoline, kerosene, oil, flamethrower, or incendiary grenades.

e. Bend. Bend the panels, casing, and connectors.

Warning: **Be extremely careful with explosive and incendiary devices. Use these items only when the need is urgent.**

f. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

g. Disposal. Burn or scatter the destroyed parts in slit trenches, foxholes, or other holes, or throw into nearby streams.

APPENDIX A

REFERENCES

Following is a list of applicable references which are available to personnel concerned with Radio Set AN/TRC–146:

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310–7	U.S. Army Equipment Index of Modification Work Orders.
SB 11–614	Caution Notice for Antenna Bases, Towers, and Other Mast Structures.
SB 38–100	Preservation, Packaging and Packing Materials, Supplies, and Equipment Used by the Army.
TB SIG 291	Safety Measures to be Observed When Installing and Using Whip Antennas, and Metal Poles That are Used With Communication, Radar, and Direction Finder Equipment.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 5–6115–271–15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Generator Set, Gasoline Engine: 3 KW (Less Engine) 3KW, AC, 400 Cycle (Military Model HF 3.0 MD) FSN 6115–075–1638 and FSN 6115–012–1993; 3 KW, AC, 60 Cycle (Military Model SF 3.0 MD) FSN 6115–075–1640 and FSN 6115–913–9290; 3 KW, DC, 28 V (Military Model DC 3.0 MD/28 V) FSN 6115–012–1997.
TM 5–6115–271–25P	Organizational, DS, GS, and Depot Maintenance Repair Parts and Special Tool Lists: Generator Set, Gasoline Engine, 3 KW (Less Engine) 3 KW, AC, 400 Cycle (Military Model HF 3.0 MD) FSN 6115–075–1638 and FSN 6115–012–1993; 3 KW, AC, 60 Cycle (Military Model SF 3.0 MD) FSN 6115–075–1640 and FSN 6115–913–9290; 3 KW, DC, 28 V (Military Model DC 3.0 MD/28 V) FSN 6115–012–1997.
TM 5–6115–365–15	Organizational, DS, GS, and Depot Maintenance Manual; Including Repair Parts: Generator Sets, Gasoline and Diesel Engine Driven, Trailer Mounted PU–236A/G, PU–236/G FSN 6115–393–1709, PU–236B/G FSN 6115–738–6334, PU–253A/U, PU–253/U FSN 6115–697–2402, PU–332/G FSN 6115–577–8471 PU–332A/G FSN 6115–738–6336, PU–375–A/G, PU–375/G FSN 6115–753–2231, PU–401/M FSN 6115–823–2217 PU–402/M FSN 6115–722–3760 PU–406/M FSN 6115–738–6342, PU–409/M FSN 6115–702–3348, PU–409A/M FSN 6115–738–6338, PU–495/G FSN 6115–823–2218, PU–551/G FSN 6115–889–1307, PU–564A/G FSN 6115–738–6341, PU–617/M FSN 6115–738–6335, PU–618/M FSN 6115–738–6337, PU–619/M FSN 6115–738–6339, PU–620/M FSN 6115–738–6340.

TM 11–2087	Switchboards SB–53/FTC and SB–53A/FTC.
TM 11–5805–201–12	Operator and Organizational Maintenance Manual: Telephone Set TA–312/PT.
TM 11–2651	Antenna Groups AN/GRA–4 and AN/GRA–12.
TM 11–4000	Troubleshooting and Repair of Radio Equipment.
TM 11–5805–204–15	Organizational, DS, GS, and Depot Maintenance Manual: Panel, Patching, Communication SB–611/MRC, Including Repair Parts and Special Tool Lists.
TM 11–5805–262–12	Operator's and Organizational Maintenance Manual: Switchboards, Telephone, Manual SB–22/PT and SB–22A/PT.
TM 11–5805–294–15	Operation and Organizational and Field Maintenance Manual: Switchboard, Telephone, Manual SB–993/GT.
TM 11–5805–329–12	Operator's and Organizational Maintenance Manual: Switchboard, Telephone, Manual SB–1315/FT.
TM 11–5805–335–15	Operator, Organizational, Field and Depot Maintenance Manual: Panels, Circuit Terminations SB–1527/FT and SB–1528/FT.
TM 11–5815–206–12	Organizational Maintenance Manual: Teletypewriter Set AN/PGC–1 and Teletypewriters TT–4A/TG, TT–4B/TG, TT–4C/TG, TT–335/TG, and TT–537/G.
TM 11–5815–206–20P	Organizational Maintenance Repair Parts and Special Tool Lists: Teletypewriter Set AN/PGC–1 and Teletypewriters TT–4A/TG, TT–4B/TG, TT–4C/TG, and TT–335/TG.
TM 11–5820–467–15	Operator, Organizational, Field and Depot Maintenance Manual: Antenna Group AN/GRA–50.
TM 11–5820–467–25P	Organizational, Field and Depot Maintenance Repair Parts and Special Tool Lists: Antenna Group AN/GRA–50.
TM 11–5820–509–12	Operator and Organizational Maintenance Manual: Radio Set AN/PRC–47.
TM 11–5820–514–12	Organizational Maintenance Manual, Including Repair Parts and Special Tool Lists: Radio Set AN/MRC–95.
TM 11–5820–527–15	Operator, Organizational, Direct and General Support, and Depot Maintenance Manual: Radio Set AN/TRC–75.
TM 11–5820–672–12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Radio Sets AN/GRC–158 and AN/MRC–117.
TM 11–5820–696–15	Organizational, DS, GS, and Depot Maintenance Manual: Communications Facility, Mobilized AN/MRC–119 and Communications Facility, Jeep Mounted AN/MRC–120.
TM 11–5821–248–12	Organizational Maintenance Manual: Radio Set AN/ARC–102.
TM 11–5821–248–20P	Organizational Maintenance Repair Parts and Special Tools Lists: Radio Set AN/ARC–102.
TM 11–5821–271–15	Organizational, DS, GS, and Depot Maintenance Manual: Couplers, Antenna CU–1658/A and CU–1669/GRC.
TM 11–ɔ895–558–15	Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts: Radio Set AN/TRC–146.
TM 11–6625–200–12	Organizational Maintenance Manual: Multimeters ME–26A/U, ME–26B/U, ME–26C/U, and ME–26D/U.

TM 11–6625–203–12	Operator and Organizational Maintenance: Multimeter AN/URM–105, Including Multimeter ME–77/U.
TM 11–6625–320–12	Operator and Organizational Maintenance Manual: Voltmeter, Meter ME–30A/U and Voltmeters, Electronic ME–30B/U, ME–30C/U, and ME–30E/U.
TM 11–6625–622–12	Organizational Maintenance Manual Including Repair Parts and Special Tool Lists: Test Harness, Radio Set AN/URM–157.
TM 11–6625–682–15	Organizational, DS, GS, and Depot Maintenance (Including Repair Parts and Special Tool List): Meter, Field Strength ME–61/GRC.
TM 38–750	Army Equipment Record Procedures.

APPENDIX B

BASIC ISSUE ITEMS

Section I. INTRODUCTION

1. General

This appendix lists items for AN/TRC–146, the component items comprising it, and the items which accompany it, or are required for installation, operation, or operator's maintenance.

2. Explanation of Columns

An explanation of the columns in section II is given below.

a. Source, Maintenance, and Recoverability Codes, Column 1.

(1) *Source code, column 1a.* The selection status and source for the listed item is noted here. The source code used is—

Code	*Explanation*
A	Applies to assemblies which are not procured or stocked as such but are made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.

(2) *Maintenance code, column 1b.* The lowest category of maintenance authorized to install the listed item is noted here. The maintenance code used is as follows:

Code	*Explanation*
C	Operator/Crew

(3) *Recoverability code, column 1c.* The information in this column indicated whether unserviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

Note. When no code is indicated in the recoverability column, the part will be considered expendable.

Code	*Explanation*
R	Applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and normally are furnished by supply on an exchange basis.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, a five-digit manufacturer's code, and a part number are included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g. ea, pr, ft, yd, etc.) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. The total quantity of the item used in the equipment is given in this column.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

h. Illustration, Column 8. Not used.

SECTION II. BASIC ISSUE ITEMS LIST

(1) SOURCE CD	(1) MAINT. CD	(1) REC. CODE	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	(8) ILLUSTRATIONS (A) FIGURE NUMBER	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
			5895-933-5443							RADIO SET AN/TRC-146 (This item is nonexpendable.)						
										TECHNICAL MANUAL TM 11-5895-558-15	ea		1	1		
										Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facility.						
										NOTE: A quantity of one technical manual is packed with each equipment. Where a valid need exists, additional copies may be requisitioned and kept on hand.						
										ANTENNA BASE: 00414; 76011	ea		1	1		
			[illegible]							ANTENNA ELEMENT AT-1039/U	ea		1	1		
			5985-733-6043							ANTENNA ELEMENT AT-1040/U	ea		1	1		
			5985-733-6044							ANTENNA ELEMENT AT-1041/U	ea		1	1		
			5985-783-6045							ANTENNA ELEMENT AT-1042/U	ea		1	1		
			5985-733-6046							ANTENNA ELEMENT AT-1043/U	ea		4	4		
										ANTENNA GUY LINE FITTING: 13499; 762-2001-000	ea		1	1		
										CABLE ASSEMBLY, POWER (8 FT): 13499; 762-1181-00	ea		1	1		
										CABLE ASSEMBLY, POWER (8 FT): 13499; 762-1180-001	ea		1	1		
										CABLE ASSEMBLY, POWER (10 FT): 13499; 762-1969-001	ea		1	1		
										CABLE ASSEMBLY, CONTROL (100 FT): 13499; 762-2009-101	ea		1	1		
										CABLE ASSEMBLY, RADIOFREQUENCY (100 FT): 13499; 762-1403-001	ea		1	1		
										CABLE ASSEMBLY, CONTROL (100 FT): 13499; 762-1404-001	ea		1	1		
										CABLE, GROUND (6 FT): 13499; 762-1160-001	ea		3	3		

(1) SOURCE CD (A)	(1) MAINT. CD (B)	(1) REC. CODE (C)	BASIC ISSUE ITEMS LIST (2) FEDERAL STOCK NUMBER	(3) DESCRIPTION MODEL 1 2 3 4 5 6	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	(8) ILLUSTRATIONS (A) FIGURE NUMBER	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
				AN/TRC-146 (continued)						
A	C	R		CONTROL CONSOLE: 13499; 762-1178-102	ea		1	1		
A	C	R	5985-939-7495	COUPLER, ANTENNA CU-1669/GRC	ea		1	1		
	C		5965-842-1827	MICROPHONE, CARBON: 81134; 205STCKKP	ea		1	1		
	C			NYLON GUY ROPES: 13499; 762-1237-00 (30 ft)	ea		3	3		
A	C	R		POWER INVERTER: 12175; 4S1250-1P	ea		1	1		
A	C	R		POWER SUPPLY: 12175; PS-65-176	ea		1	1		
A	C	R	5821-954-0853	RECEIVER-TRANSMITTER, RADIO RT-698/ARC-102	ea		1	1		
				NO ACCESSORIES, TOOLS, OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
				NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Radio Set AN/TRC-146. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Not used.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	*Maintenance Category*
C	Operator/Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section III.

e. Remarks. Self explanatory.

3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. Not used.

MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	[illegible]	[illegible]	O [illegible]										2 [illegible]	Visual [illegible]
			[illegible]										3,6,7,15	Basic troubleshooting Voltage and resistance measurements and use of special test set
			H										3,6 thru 10, 16,17	All tests not required depot [illegible]
			D										[illegible] thru 14, 16,17	
				[illegible]				[illegible]					[illegible]	[illegible]
										O F			[illegible] 4, 5	By replacement of running spares Replacement of major modules and subassemblies cable and some component repairs
										[illegible]			4.[illegible]	All major repairs
												[illegible]	4,5	[illegible]
	[illegible]			#										See TM 11-5821-248-12
	POWER UNIT CASE	[illegible]											[illegible]	Frayed or broken cables secure cable lugs
			[illegible]										[illegible]	Voltage and resistance measurements, continuity checks
			H										3,6 thru 10	All tests
										[illegible]			4,5	[illegible] cable assemblies
										[illegible]			[illegible]	All major repairs down to individual circuit components
												[illegible]	[illegible]	Plus shop facilities

MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/TRC-146 (continued)													
	POWER SUPPLY, UNITRON MODEL PS-65-176	O											1	Check cable connections, clean air filter
			F										3,7	Check for faulty components, through troubleshooting procedures
			H										8,9	Major tests
			D										11,12,13,14	
										F			4,5	Cables and connectors
										H			4,5	All major repairs
												D		Plus shop facilities
	INVERTER UNITRON MODEL 4SI250-IP		O										2	Check connector for proper voltage
			F										3,6,7	Continuity, voltage and resistance measurements
			H										8,9,10,11	Major tests
			D										11,...,15	Final tests
										F			4,5	Cable assemblies
										H			4,5	All major repairs
												D	4,5	Plus shop facilities
	ANTENNA COUPLER CASE	O												Cables
			F										3	Cable continuity, shorts
										F			4,5	Replace cables, lugs
										H			4,5	Repair cables assemblies
												D	4,5	
	ANTENNA COUPLER CU-1669/GRC			#										See TM 11-5821-271-15
	ACCESSORY CASE	O												Visual
										O			1	Replace console, vox module
												D	4,5	

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MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/TRC-146 (continued)													
	CONTROL CONSOLE		F										3,6,7	Continuity, voltage and resistance measurements
			H										3,6,7,8,9,10	All major tests
										F			4,5	By replacing control panel, and speaker amplifier assembly, switches and potentiometers
										H			4,5	All major repairs
												D	4,5	Plus shop facilities
	VOX ASSEMBLY	O											1	Faulty soldering connections broken main board
			F										3,6,7	Check relays, continuity components on main board
			H										3,6,7,8,9,10	All major tests
										F			4,5	Replace main board, relays pots
										H			4,5	All major repairs
	AMPLIFIER SPEAKER ASSEMBLY		F										3	Rough check for transistors and resistors R3 and R4
			H										6,7	All major tests
										F			4,5	By removing speaker repairing cable connections
										H			4,5	Replaces transistors, and all other major repairs
	RADIO SET CONTROL C-3940/ARC-9			#										See TM 11-5821-248-12
	DIFFERENTIAL CARBON MICROPHONE			#										See TM 11-5820-514-12
	[illegible]									O			1	Repair strap
												D	4,5	Plus shop facilities
	[illegible] ELEMENTS AT-1039/U, -1040/U, -1041/U, [illegible]			#										See TM 11-5820-514-12

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MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AN/TRC-146 (continued)													
	ANTENNA BASE, COLUMBIA PRODUCTS P/N 76011									O			1	By replacement
	CABLE ASSEMBLIES AND POWER CABLES	O											2	Visual and continuity power control
			F										3	Continuity (harnesses)
										O			1	By replacement of cable and connector
										F			4,5	Easily accessible repairs
										H			4,5	Complete repair
												D	4,5	Plus shop facilities
	ANTENNA KIT, INCLUDING CANVAS BAG, GUY ANCHOR, NYLON GUY ROPES, ANTENNA GUY LINE FITTING	O						O						Visual
										O			1	By replacement of components
										F			4,5	

#Indicates that maintenance guidance will be found in documents referenced in remarks column.

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TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
		AN/TRC-146 (continued)		
1	O	TK-101/G	5180-064-5178	
2	O	MULTIMETER AN/URM-105		
3	F,H,D	MULTIMETER TS-352/U		
4	F,H,D	TK-100/G (TOOL KIT)	5180-605-0079	
5	F,H,D	TK-105/G (TOOL KIT)	5180-610-8177	
6	F,H,D	ME-30/U (AC VTVM)		
7	F,H,D	(VOLT OHMMETER) ME-26B/U	6625-360-249	
8	H,D	(SPECTRUM ANALYZER)TS-723A/U	6625-833-2602	
9	H,D	(SCOPE) AN/USM-141	6625-957-4136	
10	H,D	DIGITAL READOUT ELECTRONIC COUNTER AN/USM-207		
11	D	POWER SUPPLY HP-520A		
12	D	LOAD BANK, 0-60 AMPS, 28 VDC (SUPERIOR ELECTRIC CO. TYPE 136, POWER STAT)		
13	D	LOAD BANK, VARIABLE 350 VA		
14	D	115 VOLT, 60 CYCLE, 2KVA POWER SOURCE		
15	F,H,D	TEST SET ANTENNA COUPLER AN/ARM-109*	6625-627-8592	
16	H,D	DUMMY LOAD ELECTRICAL DA-229/GRM-21	6625-767-8255	
17	H,D	DUMMY LOAD 50 OHMS DA-75/U		

*SPECIAL TEST SET FOR ANTENNA COUPLER

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By Order of the Secretary of the Army:

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